Report to Inform Appropriate Assessment

MarramWind Offshore Wind Farm

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MarramWind

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Appendix E Offshore and Intertidal Ornithology In-Combination Assessment

Executive Summary

MarramWind Offshore Wind Farm (hereafter referred to as 'the Project') is wholly owned by ScottishPower Renewables UK Limited (SPR). MarramWind Limited, a subsidiary of SPR, is the Applicant for the Project.

This Report to Inform an Appropriate Assessment (RIAA) sets out the findings of a study to inform the second stage of the Habitats Regulations Appraisal (HRA) required for the offshore components of the Project to ensure compliance with the Habitats Regulations.

The study set out in this report (a study to inform an Appropriate Assessment and associated appendices) considers whether the Project could have adverse effects on site integrity (AEoSI) either alone or in combination with other plans or projects.

An Appropriate Assessment of the Project has been carried out in view of the conservation objectives for each European site (also referred to as designated sites) screened into the assessment, the best available evidence, and in view of the measures proposed to avoid or mitigate the potential for Likely Significant Effects (LSE). The three receptor groups assessed within this RIAA include: marine mammals, offshore and intertidal ornithology and terrestrial ecology and ornithology.

Marine Mammals

Within the HRA Screening Report, only one site was considered to be screened in for assessment regarding marine mammals due to the potential for connectivity between the Project and the Moray Firth Special Area of Conservation (SAC). Key baseline information for marine mammals were informed by a total of 24 site-specific digital aerial surveys, flown between April 2021 and March 2023 covering the entire Project Option Agreement Area (OAA) and a surrounding 4km buffer. These data were supported by publicly available datasets and published literature, information on the relevant management unit population and designated site information for the Moray Firth SAC, which features bottlenose dolphins as a qualifying feature of the site.

After detailed consideration of the potential for AEoSI, a conclusion was determined that no AEoSI will result from the Project alone or in-combination with other plans and projects for the Moray Firth SAC.

Offshore and Intertidal Ornithology

For offshore ornithology a total of 24 site specific digital aerial surveys were flown between April 2021 and March 2023 covering the entire Project OAA and a surrounding 4km buffer.

For intertidal ornithology a total of 12 site-specific vantage points surveys were conducted between September 2022 and August 2023 covering the proposed landfall sites and a surrounding 500m buffer.

For the Project alone, the potential for an AEoSI could not be ruled out for the guillemot feature of Buchan Ness to Collieston Coast Special Protection Area (SPA) in relation to distributional response effects relating to the OAA, though only when considering the upper limit of the guidance approach. This is due to population viability analysis (PVA) results predicting a reduction in growth rate of 0.48% per annum. Such a reduction in growth rate could not be ruled out as potentially effecting the long-term integrity of the feature.

For the Project in-combination with other plans and projects, the potential for an AEoSI could not be ruled out for the guillemot feature of Buchan Ness to Collieston Coast SPA, Troup, Pennan and Lion's Heads SPA and Copinsay SPA in relation to distributional response effects relating to the OAA. This is due to PVA results predicting a reduction in growth rate that could not be ruled out as potentially effecting the long-term integrity of the features. For all other Project assessments both alone and in-combination, the potential for an AEoSI was confidently ruled out. As the potential for an AEoSI could not be ruled out for the above features and designated sites, the Project reviewed the potential for further mitigation to be implemented. However, no possible mitigation was identified which would reduce the overall predicted impact to a level where the potential for an AEoSI could be confidently ruled out, without compromising the economic feasibility of the Project. Therefore, the Project has proposed a package of compensatory measures within the derogation process under Steps 3 and 4 of HRA. Further details of the Project's derogation case is provided within the **Derogation Case**.

Terrestrial Ecology and Ornithology

Within the HRA Screening Report, four sites were screened in for assessment regarding terrestrial ecology and ornithology due to the potential for connectivity between the Project and pink-footed goose, which is a qualifying interest feature of Loch of Strathbeg SPA / Ramsar, Ythan Estuary, Sands of Forvie and Meikle Loch SPA and Ythan Estuary and Meikle Loch RAMSAR. However, following further design iterations subsequent to the production of the HRA Screening Report, connectivity was only considered in relation to the Loch of Strathbeg SPA / Ramsar population.

Key baseline information which informed the assessment for pink-footed geese included two seasons of wintering birds surveys; the first undertaken between September 2022 and April 2023, which covered the initial Scoping Boundary and the second between September 2023 and March 2024, which focussed on the Proposal of Application Notice Boundary. These data were supported by designated site information for the Loch of Strathbeg SPA / Ramsar, publicly available datasets and published literature, including historical foraging distribution surveys of pink-footed geese around the Loch of Strathbeg.

Pink-footed geese were recorded foraging over winter within 500m of the Onshore Red Line Boundary. However, a Bird Protection Plan will ensure disturbance effects to pink-footed geese at the Scotstown Landfall are adequately mitigated over winter periods during construction and decommissioning stages.

After detailed consideration of the potential for AEoSI, a conclusion was determined that no AEoSI will result from the Project alone or in-combination with other plans and projects for the Loch of Strathbeg SPA / Ramsar.

1. Introduction

1.1 MarramWind Offshore Wind Farm

1.1.1.1 MarramWind Offshore Wind Farm (hereafter referred to as 'the Project') is wholly owned by ScottishPower Renewables UK Limited (SPR).

1.1.1.2 The Project is a proposed floating wind farm located in the North Sea, with a grid connection capacity of up to 3 gigawatts (GW). The location of the Project is determined by the Option Area Agreement (OAA), which is the spatial boundary of the Northeast 7 (NE7) Plan Option within which the electricity generating infrastructure will be located. The NE7 Plan Option is located north-east of Rattray Head on the Aberdeenshire coast in north-east Scotland, approximately 75 kilometres (km) at its nearest point to shore and 110km at its furthest point. An Option to Lease Agreement for the Project within the NE7 Plan Option was signed in April 2022.

1.1.1.3 A description of the Project is provided in **Chapter 2**.

1.2 The Applicant

1.2.1.1 MarramWind Limited, a subsidiary of SPR, is the Applicant for the Project.

1.2.1.2 SPR is part of the ScottishPower group of companies, operating in the UK under the Iberdrola Group, and is a leading UK renewables developer with over 40 operational windfarms generating 3GW of green energy. ScottishPower is the first integrated energy company to generate 100% green electricity in the UK. Focused on wind energy, smart grids and driving the change to a greener future, ScottishPower is investing £24bn to 2028 on renewable power and transmission and distribution grids.

1.2.1.3 Iberdrola Group is a world leader in the development of offshore wind energy, with five operational windfarms and four major projects under construction. With a committed investment of €8bn from 2025 to 2028, this will give 5.7GW of installed Offshore capacity by 2028. This is part of the €58bn investment plan announced in 2025 by Iberdrola, 35% of which is being invested to grow the overall installed capacity of renewable power to 60GW by 2028.

1.3 Overview of the Project

1.3.1.1 The Project's generating infrastructure will be located in the North Sea, within the 'Scottish Zone' (as defined in the Scotland Act 1998) of the United Kingdom (UK) Exclusive Economic Zone. The generating infrastructure is specifically located within the spatial extent of the NE7 Plan Option, covered by the OAA. The Project's location is shown in **Figure 1**.

1.3.1.2 The Red Line Boundary is a geographical area within which the offshore wind farm and its associated offshore and onshore infrastructure will be located. It represents the boundary identified for the relevant planning and consent applications. The Red Line Boundary is presented in **Figure 1** and described in **Chapter 2**.

1.3.1.3 In March 2024, NESO published the 'Beyond 2030' report, which presented the ScotWind elements of the HND FUE. This report confirmed that the full 3GW connection for the Project will be connected to the Scottish and Southern Electricity Networks (SSEN) Netherton Hub at Longside, near Peterhead. This update informed further refinement of the Project design envelope following the EIA Scoping Stage in January 2023 (see **Volume 1, Chapter 3: Site**

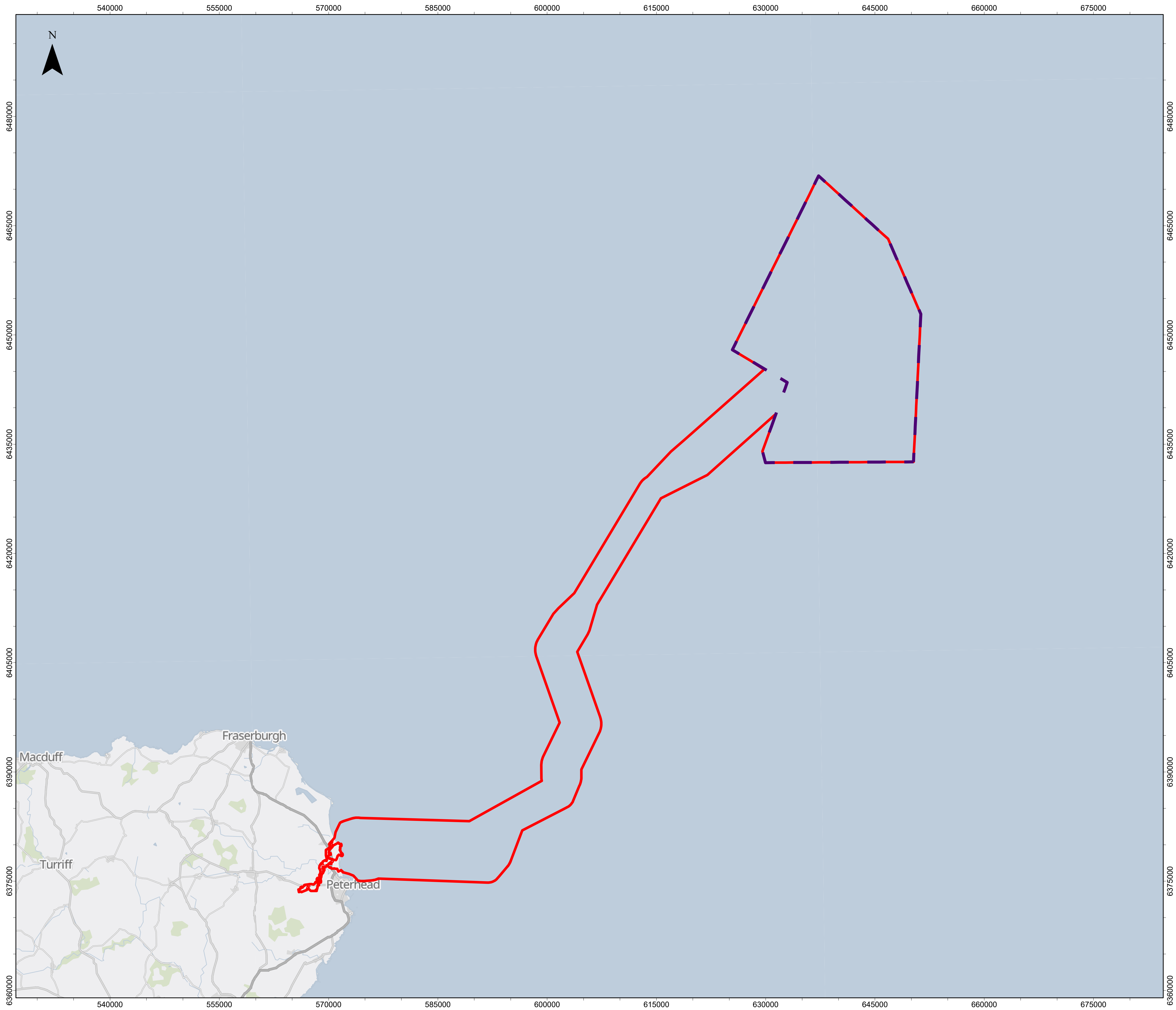
Selection and Consideration of Alternatives of the **Environmental Impact Assessment (EIA) Report** for further details).

1.3.1.4 The Project's offshore infrastructure, located seaward of Mean High Water Springs (MHWS), includes the following:

- wind turbine generators (WTGs), including floating units (platforms and station keeping system);
- array cables;
- subsea distribution centres (SDCs);
- subsea substations;
- offshore substations;
- reactive compensation platform(s) (RCPs) (if required); and
- offshore export cables to connect the offshore infrastructure to the landfall(s).

1.3.1.5 The Project's onshore infrastructure, located landward of Mean Low Water Springs (MLWS) includes:

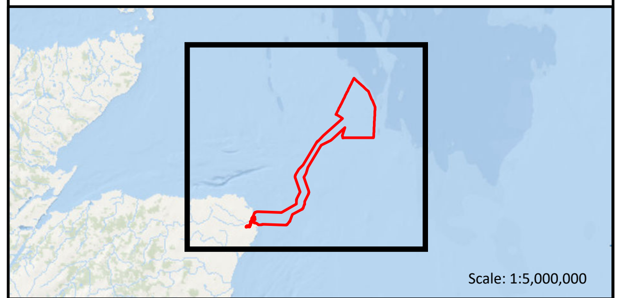
- landfall(s) – the infrastructure associated with landfall(s) located above MLWS;
- underground onshore export cables running from the landfall(s) to the onshore substations;
- onshore substations co-located at one site;
- underground grid connection cables connecting the onshore substations to the grid connection point at SSEN Netherton Hub; and
- tie-in to the grid connection point (SSEN substation at the SSEN Netherton Hub, which is a separate project and does not form part of the consenting applications that this Report to Inform Appropriate Assessment (RIAA) relates to).



Red Line Boundary

Option Agreement Area

0 10 20 Kilometres



	dd/mm/yyyy	--	--	--	--
2	22/10/2025	LT	AMc	MR	LG
1	06/10/2025	LT	AMc	MR	LG
REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER

WSP DRAWING NUMBER 808368-WEIS-IA-R4-FG-F4-21416

MarramWind DRAWING NUMBER MAR-GEN-ENV-MAP-WSP-000601

DATUM	ETRS 89	PROJECTION	UTM Zone 30N
SCALE	1:500,000	PAGE SIZE	A3

PROJECT TITLE

MarramWind Offshore Wind Farm

DRAWING TITLE

Figure 1 Red Line Boundary

Report to Inform Appropriate Assessment (RIAA)

NOT TO BE USED FOR NAVIGATION

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MarramWind

1.4 Purpose of this Report

1.4.1.1 An HRA Screening Report was published in August 2024 and the competent authorities provided feedback in November 2024. This RIAA now follows on from the outcomes of the HRA Screening Report and the feedback received, to assess in detail whether the Project, in light of any mitigation aimed at avoiding or reducing environmental harm, will have an adverse effect on the integrity (hereafter AEoSI) of the sites screened in for Appropriate Assessment (AA).

1.4.1.2 Under Regulation 48 of the Conservation (Natural Habitats, &c.) Regulations 1994, Regulation 28 of the Conservation of Offshore Marine Habitats and Species Regulations 2017 and Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended) (the "Habitats Regulations"), an applicant applying for any consent, permission or other authorisation for a plan or project must provide such information as the competent authority may reasonably require for the purposes of the assessment or to enable them to determine whether an AA is required. Thus, the Applicant is responsible for assembling and describing all the relevant information required to enable the competent authorities to carry out their HRA responsibilities. Ramsar sites are also assessed under Policy 4 of the Scottish Government's National Planning Framework 4 (NPF4).

1.4.1.3 Both Aberdeenshire Council and Marine Directorate Licensing and Operations Team (MD-LOT) (on behalf of Scottish Ministers) are the competent authorities for the purposes of the Habitats Regulations in relation to this Project. The Habitats Regulations require competent authorities, before granting consent for a plan or project, to carry out an AA in circumstances where the plan or project is likely to have a significant effect on a European site, either alone or in combination with other plans or projects.

1.5 Structure and contents

1.5.1.1 The RIAA is structured as follows:

- **Chapter 1: Introduction**;
- **Chapter 2: Project Description**;
- **Chapter 3: HRA Process and Summary of HRA Screening**;
- **Chapter 4: Environmental Baseline Conditions**;
- **Chapter 5: Summary of Impacts**;
- **Chapter 6: Assessment of Adverse Effects on Site Integrity Alone**;
- **Chapter 7: Assessment of Adverse Effects on Site Integrity In-Combination**;
- **Chapter 8: Summary RIAA and Conclusion**;
- **Chapter 9: References**; and **Chapter 10: Glossary and Abbreviations**.

1.5.1.2 Appendices that provide information to support this RIAA are as follows:

- **Appendix A: Screening Assessment Table**;
- **Appendix B: Commitments Register**;
- **Appendix C: HRA Apportionment Report**;
- **Appendix D: HRA Population Viability Analysis Report**; and

Appendix E: Offshore and Intertidal Ornithology In-Combination Assessment.

2. Project Description

2.1 Overview

2.1.1.1 This Section of the RIAA provides a description of the Project and summarises the key components including the offshore wind farm and associated onshore / offshore infrastructure. It also describes the key activities that will be undertaken during construction, operation and maintenance (O&M), and decommissioning, along with indicative timescales. The details within this Section provide the basis for the assessment of effects undertaken for the RIAA.

2.1.2 Design envelope

2.1.2.1 The description of the Project for the purposes of the RIAA is indicative and a 'design envelope' approach, also known as the 'Rochdale Envelope', has been adopted. The provision of a design envelope is intended to identify key design assumptions to enable the environmental assessment to be carried out whilst retaining enough flexibility to accommodate further refinement during detailed design. The design envelope approach is widely used and accepted for major infrastructure projects in the UK, including for recent applications for offshore wind farms. The approach is recognised by Marine Scotland and the Energy Consents Unit in their guidance on how the design envelope assessment approach may be applied in the context of applications received for generating stations under s.36 of the Electricity Act 1989 (Scottish Government, 2022). This states:

"…*in some instances, the nature of the proposed development and evolving technology mean that some aspects of the final project are yet to be settled in precise detail at the time that the application is submitted (such as the precise location of certain types of infrastructure, the foundation type, the size of certain structures or the turbine model). Where that is the case and some details are still the be finalised, the design envelope approach can be employed for such applications to enable a degree of flexibility and address these uncertainties. Through the design envelope approach, the application can set out parameters for the proposal including the maximum extents of the proposal and can assess on that basis what the likely worst case effects of the proposal may be. The detailed design of the project can then vary within this 'envelope' to ensure that the project as-constructed has been properly assessed.*"

2.1.2.2 There is also UK guidance for the design envelope approach, including within the UK National Policy Statement for Renewable Energy Infrastructure (EN-3) (Department for Energy Security & Net Zero, 2023) and in the Planning Inspectorate's Advice Note Nine: Rochdale Envelope (Planning Inspectorate, 2018a). Both of these guides closely align with the Marine Scotland and the Energy Consents Unit guidance.

2.1.2.3 Assessing the Project using a design envelope approach means that the assessment will consider a maximum design scenario, which allows flexibility to make design decisions in the future that cannot be finalised at the time of submission of the application for development consent. Such design decisions may include the precise models and dimensions of WTGs that will be available at the time of placing orders for the Project, a final offshore WTG layout design to optimise wind energy capture, and detailed engineering factors for both the offshore and onshore infrastructure.

2.1.2.4 This enables a meaningful and comprehensive assessment of the Project on a reasonable worst-case scenario basis, whilst maintaining flexibility for refinements to the design as it continues to evolve. The reasonable worst-case scenario defined for any given parameter may vary by technical aspect, depending on how the parameter can be expected to interact with the receptor being considered. The use of this approach has been adopted for the **EIA Report** and the RIAA and enables both documents to be based on a description of the location, design and size of the Project that is suitable to allow an assessment of its likely significant environmental effects.

2.1.3 The Project's design process

2.1.3.1 During the Project's design process, changes to the design have been made as more environmental and engineering information became available and in response to stakeholder feedback. **Volume 1, Chapter 3: Site Selection and Consideration of Alternatives** of the **EIA Report** describes the reasonable alternatives that have been considered by the Applicant to date, and the reasons why the proposed design envelope has been chosen instead of the alternative locations and technologies. As described in **Volume 1, Chapter 5: Approach to the EIA** of the **EIA Report** where the design is still evolving, a precautionary approach is applied to ensure a maximum design scenario that represents the worst-case scenario for marine mammals; offshore and intertidal ornithology; and terrestrial ecology and ornithology is assessed in this RIAA.

2.1.3.2 The evolution of design of the Project has taken account of consultation feedback received throughout the design process. This includes responses to MD-LOT and Aberdeenshire Council's Scoping Opinions and Statutory Consultation undertaken by the Applicant.

2.1.3.3 A summary of all issues raised as part of the Statutory Consultation feedback and the Project responses to them are provided in the **Pre-Application Consultation Report**.

2.1.4 Environmental measures

2.1.4.1 As part of the Project design process and in response to consultation, embedded environmental measures have been adopted to reduce the potential for environmental impacts and effects. They have fed iteratively into the EIA and the RIAA. As there is a commitment to implementing these embedded environmental measures and to various standard sectoral practices and procedures, they are inherently considered part of the design of the Project and are set out in the **EIA Report**. The embedded environmental measures have been developed in accordance with the mitigation hierarchy, a fundamental principle in design evolution that indicates the order in which the impacts of a development should be considered and addressed. The EIA Regulations define the mitigation hierarchy as follows:

- avoid;
- prevent;
- reduce; and
- offset

2.1.4.2 The measures are presented in full in **Volume 3, Appendix 5.2: Commitments Register** of the **EIA Report** and within **Appendix B**.

2.1.4.3 **Volume 1, Chapter 5: Approach to the EIA** of the **EIA Report** explains the approach to embedded environmental measures that has been applied in the EIA Report. The environmental assessments presented in **Section 5** to **Section 7** provide details of how specific embedded environmental measures are proposed to avoid or reduce environmental effects.

2.1.4.4 The Project acknowledges the importance of contributing positively to biodiversity and supports the principle of including nature inclusive design and nature enhancement where feasible. Opportunities, both onshore and offshore, for biodiversity enhancement have been considered and initial measures are outlined in the **Nature Positive Plan**. These measures will be further refined in consultation with stakeholders as the Project progresses.

2.1.5 Key components of the Project

2.1.5.1 The key components of the Project are described broadly in relation to the jurisdictions of the consenting regimes that cover them. As described in **Volume 1, Chapter 2: Legislative and Policy Context** of the **EIA Report**, the offshore consenting regime covers works seaward of MHWS, while the onshore consenting regime covers works landward of MLWS.

2.1.5.2 The Project's offshore infrastructure, located seaward of MHWS, includes the following:

- WTGs, including floating units (platforms and station keeping system);
- array cables;
- SDCs;
- subsea substations;
- offshore substations;
- RCPs (if required); and
- offshore export cables to connect the offshore infrastructure to the landfall(s).

2.1.5.3 The Project's onshore infrastructure, located landward of MLWS includes:

- landfall(s) – the infrastructure associated with landfall(s) located above MLWS;
- underground onshore export cables running from the landfall(s) to the onshore substations;
- onshore substations co-located at one site;
- underground grid connection cables connecting the onshore substations to the grid connection point at SSEN Netherton Hub; and
- tie-in to the grid connection point (SSEN substation at the SSEN Netherton Hub, which is a separate project and does not form part of the consenting applications that the EIA relates to).

2.1.5.4 Further details on the key components of the Project are provided in Section 4.4 of **Volume 1, Chapter 4: Project Description** of the **EIA Report**.

2.1.6 Consultation and engagement

2.1.6.1 Section 5.5 in **Volume 1, Chapter 5: Approach to the EIA** of the **EIA Report** sets out the Project's approach to consultation and engagement.

2.1.6.2 **Volume 3, Appendix 5.1: Stakeholder Issues Responses** of the **EIA Report** sets out the comments raised by stakeholders from pre-engagement, Scoping workshops, Scoping Opinions, post-Scoping workshops relevant to the Project Description and how these have been addressed in the **EIA Report**.

2.2 Phasing and the requirement for design flexibility

2.2.1.1 Given the scale of the Project, a phased approach to the installation and energisation of the WTGs is proposed. The Applicant intends to apply the design envelope approach to the EIA, which will provide the reasonable worst-case parameters or scenario that will encompass the flexibility required for relevant Project infrastructure. The need for a phased approach and an explanation of the necessary design envelope flexibility are described in Section 4.2.2 of **Volume 1, Chapter 4: Project Description** of the **EIA Report**.

2.2.2 Design flexibility

2.2.2.1 The Applicant is proposing to retain the following design flexibility associated with the phased build out of the Project.

Wind turbine generators

2.2.2.2 The generating capacity of the offshore wind array depends upon a range of WTG specifications, which are not yet agreed. For the basis of assessment, each WTG will have an individual generation capacity of up to 25 megawatts (MW).

2.2.2.3 Depending on the final WTGs selected, the Project is expected to have in the region of 126 to 225 WTGs. This is the current basis of assessment for the **EIA Report** and the RIAA. As WTG technology is continually evolving, it is difficult to definitively predict the generating capacity of WTGs that will be commercially available at the point of construction.

2.2.2.4 As the phased installation and energisation of the WTGs will take place over a period of up to 12 years, the WTG parameters may therefore vary between each phase.

Floating units

2.2.2.5 The WTGs will each be mounted on a floating unit, which will consist of a floating platform or ‘floating unit’ that will be secured to the seabed by a dedicated ‘station keeping system’ consisting primarily of mooring lines and seabed anchors.

2.2.2.6 Several design options are being considered for the floating unit at this stage of the Project. The final design concept will be identified following further market engagement, site survey and design development.

2.2.2.7 The EIA and the RIAA will consider a design envelope associated with a potential range of floating unit types. Similar to the WTGs, the floating unit concept may vary between phases and also within the same phase more than one concept may be deployed.

Transmission technology

2.2.2.8 The Project requires both High Voltage Alternating Current (HVAC) and High Voltage Direct Current (HVDC) electrical transmission technology, with both technologies and their associated infrastructure considered within the EIA and the RIAA with the appropriate design envelope.

2.2.2.9 The infrastructure required for both types of transmission is broadly similar, as illustrated in **Plate 2.1**. The key differences are as follows and are included within the Project design envelope considered in the EIA and the RIAA:

- HVDC transmission technology requires additional converter technology offshore (located on the relevant offshore HVDC substation platform within the OAA);
- HVDC is being considered for parts of the wind farm furthest from shore and where the electrical losses associated with HVAC transmission become prohibitive;
- HVAC transmission may require up to two RCP’s at a location along the offshore cable corridor route. This is dependent on the total length of transmission from the offshore

substation to SSEN Netherton Hub, with the RCP(s) expected to be approximately midway along the transmission route;

- HVAC will be used for the area of the wind farm closest to shore, where the HVAC technology is economic and efficient;
- the offshore and onshore export cables will be different in number, design, installation and spacing between HVDC and HVAC; and
- the onshore substations will be different in design and size for HVDC and HVAC.

2.2.2.10 The transmission of electricity from the Project's onshore substations to the point of connection at SSEN's Netherton Hub will be via an HVAC connection.

Landfall(s) location

2.2.2.11 It has been necessary to present more than one landfall option in the **EIA Report** and the RIAA due to landfall space requirements for a 3GW project and the number of both offshore wind farms and transmission projects seeking to make landfall in the vicinity of Peterhead.

2.2.2.12 The inclusion of multiple landfall options is intended to provide the Project with flexibility with regard to securing sufficient space, in appropriate locations, to construct the landfall(s) and associated onshore and offshore export cables necessary to facilitate a 3GW Project, whilst ensuring any environmental impact is kept to a minimum in isolation and cumulatively.

2.2.2.13 The locations of the landfall(s) options are shown in **Volume 2, Figure 4.1: Onshore Red Line Boundary and indicative onshore infrastructure layout**.

2.2.2.14 The landfall(s) options that are assessed in the **EIA Report** and the RIAA are:

- Option 1: Lunderton – all export cables would make landfall at Lunderton, based on the following scenarios:
  - Option 1a: all export cables make landfall at Lunderton North; or
  - Option 1b: all export cables would make landfall at a combination of Lunderton North and Lunderton South;
- Option 2: Scotstown and Lunderton – export cables would make landfall at a combination of Lunderton (North and / or South) and Scotstown.

2.2.2.15 A final decision on the landfall/s to be taken forward will be subject to land agreements and detailed design post-consent.

Onshore substations

2.2.2.16 The onshore substations will house the electrical components required to ensure that the Project's export power is compliant (NESO, 2023) at the time of connection to SSEN Netherton Hub.

2.2.2.17 The onshore substation for each phase of the Project will either be an HVAC substation, or an HVDC converter station, see Transmission Technology section above. The onshore substation for each phase of the Project will be co-located on one site. As both transmission technologies may be required, both options are assessed in the **EIA Report** and the RIAA.

2.2.2.18 The inclusion of both HVAC and HVDC technology requires both gas insulated switchgear (GIS) and air insulated switchgear (AIS) to be considered. The onshore substations electrical infrastructure may require to be fully housed in buildings or be partially placed outdoors. Consequently, both options are assessed in the **EIA Report** and the RIAA.

Approach to EIA

2.2.2.19 Given the design flexibility described above, each technical aspect within the **EIA Report** considers the scenario that would give rise to the greatest potential effect as relevant to the aspect-specific receptors. This reasonable worst-case scenario is presented in each aspect chapter, with clear justification for why it has been selected as the worst case for that aspect's assessment.

2.2.2.20 The scenarios identified in the **EIA Report** have been used to inform the RIAA.

2.3 Location and site information

2.3.1 Red Line Boundary

2.3.1.1 The Red Line Boundary (illustrated in **Figure 1**) used to inform the **EIA Report** and the RIAA is defined as the area within which the Project and associated infrastructure will be located, including temporary construction activities onshore for the lifecycle of the Project.

2.3.1.2 The Offshore Red Line Boundary does not include areas that may be used for the temporary floating storage of Project components (commonly referred to as 'wet storage') as these have not yet been identified. The consent and assessment of wet storage areas is outside the remit of the Project EIA and the RIAA and will be considered as part of any necessary separate consents (for example harbour development works).

2.3.2 Offshore Red Line Boundary and site information

2.3.2.1 The Offshore Red Line Boundary (illustrated in **Volume 2, Figure 4.2: Offshore Red Line Boundary**) includes:

- the NE7 OAA where the wind farm array will be located; and
- the offshore export cable corridor up to MHWS.

2.3.2.2 **Table 2.1** provides the key characteristics of the area enclosed by the Offshore Red Line Boundary.

Table 2.1 Offshore Red Line Boundary characteristics

Parameters	Values
OAA surface area	684km^2
Water depth range in OAA	87.8 to 133.7 metre (m)[1]
Closest distance to shore of OAA	75km
Farthest distance to shore of OAA	110km
Export cable corridor surface area	575km^2
Total offshore development surface area (including OAA and offshore export cable corridor)	1,259km^2

2.3.3 Onshore Red Line Boundary and site information

2.3.3.1 The Onshore Red Line Boundary and indicative onshore infrastructure footprint is illustrated in **Volume 2, Figure 4.1** of the **EIA Report** and includes the following:

- landfall(s) – the infrastructure associated with the landfall(s) located above MLWS;
- underground onshore export cables running from the landfall(s) to the onshore substations; onshore substations co-located at one site;
- underground grid connection cables (connecting the onshore substations to the grid connection point at SSEN Netherton Hub);
- tie-in to grid connection point (SSEN substation at SSEN Netherton Hub, which is a separate project and does not form part of the consenting applications which the EIA relates to); and
- associated temporary construction areas, including for example construction compounds, access tracks and haul roads.

2.3.3.2 The onshore elements of the Project are located in Aberdeenshire, Scotland. The Onshore Red Line Boundary has an elevation ranging from approximately 0.8m above ordnance datum (AOD) at its lowest point in the eastern area of the Project, rising to approximately 59.3m AOD in the southern area of the Project.

2.3.3.3 The onshore infrastructure is predominantly situated on agricultural land, with residential areas at St Fergus to the west and Inverugie to the south-east. The larger town of Peterhead also lies to the east / south-east of the Project, and scattered dwellings are present in the surrounding area. Longside Airfield is located directly to the west of the onshore export cable corridor before crossing the A950 and is located to the north of the onshore substations.

2.3.3.4 The Project has good accessibility from the A950 road to the west of Peterhead and from the A90, which intersects the Project in the north.

2.3.3.5 There are numerous watercourses present within the Onshore Red Line Boundary. These range in size from field drainage ditches to the River Ugie and its wider catchment. The majority of these watercourses drain into the River Ugie, which is formed from the confluence of the North and South Ugie Waters and flows in a predominantly eastern trajectory before discharging into the North Sea, directly north of Peterhead, Aberdeenshire.

2.3.3.6 **Table 2.2** provides the key characteristics of the area enclosed by the Onshore Red Line Boundary.

Table 2.2 Onshore Red Line Boundary characteristics

Parameters	Values
Onshore export cable corridor length	Approximately 13.35km.
Typical onshore export cable corridor width	From the landfall(s) to the onshore substations, the temporary corridor is typically up to 89m wide, with a permanent (servitude) width of typically up to 61m. From the onshore substations to SSEN Netherton Hub, the corridor is typically up to 99m wide, with a permanent (servitude) width of typically up to 71m.

2.4 Key components of the Project infrastructure

2.4.1.1 For the purpose of the RIAA, the key components of the Project are separated into offshore, landfall(s) and onshore elements, with an overview of each provided below in **Sections 2.5** to **2.8**. These subsequent sections provide detail and parameters where possible at this stage of design development and are described in accordance with the indicative design envelope principle.

2.4.1.2 The key components of the Project are shown in **Plate 2.1**, noting the components that are common to both HVDC and HVAC technology. A description of the function of each component is provided in **Table 2.3**.

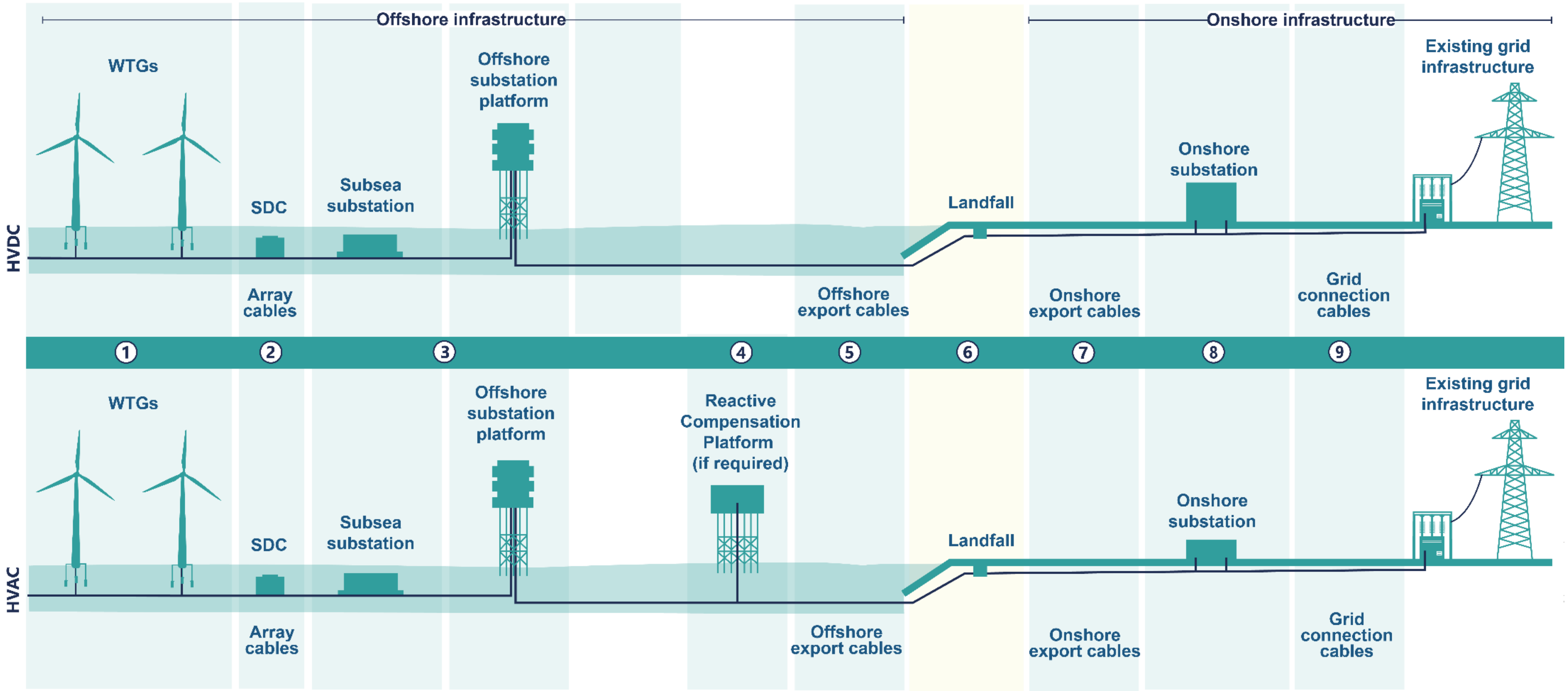
Table 2.3 Key components and functionality

Plate 2.1 ID	Component	Purpose / function
Offshore infrastructure		
1	Floating WTGs	WTGs convert wind energy to electricity. Each floating WTG will comprise a tower (assembled in sections), a rotor with three blades attached to a nacelle. The nacelle typically houses a gearbox, generator, converter, transformer, and control equipment.
	WTG floating unit	Each WTG is supported by a floating unit that is positively buoyant and moored in position on the seabed. A number of floating unit concepts are currently under consideration.
	WTG station keeping system	Each WTG on its floating unit will be secured in place using a station keeping or mooring system, involving anchors and mooring lines. Typically, multiple mooring lines will spread out radially from the floating structure, each ending in an anchor point on the seabed.
2	Array cables	Array cables will be used to connect the WTGs to the offshore substation. This will be via other WTGs if in a string or loop arrangement, or to a SDC, and then onto the offshore substation if in a star configuration. The cables will have a requirement to withstand both dynamic conditions at the floating units as well as static lay and burial in or on the seabed.
	SDC	The SDCs allow cables from multiple WTGs to connect, with a single array cable then going from the SDC to the offshore substation. Subsea distribution centres comprise a foundation support structure and protection structure.
3	Offshore substation(s)	Offshore substations are installed to collect the energy generated by the WTGs and house transmission equipment. The latter is required to convert the wind farm electricity to higher voltages necessary for long distance transmission through subsea cables to the onshore grid. Offshore substations can be above the sea surface on a platform and/or subsea. Up to four platforms may be required for the Project.
	Subsea substations	Subsea substations comprise a foundation support structure and protection structure, which is secured subsea to support

Plate 2.1 ID	Component	Purpose / function
		associated collection and transmission equipment. Given the access restrictions from being subsea, they will be designed for ease of access for operation and maintenance activities.
4	Reactive compensation platform	For HVAC transmission, there is an upper limit of offshore export cable route length, beyond which the electrical losses incurred during transmission become prohibitive. This limit can be increased using reactive power compensation equipment connected through a separate substation(s) along the offshore export cable route, typically close to the mid-point between the offshore substation and onshore substations.
5	Offshore export cables	Subsea export cables connect the offshore substation(s) to the landfall(s)where a transition joint bay links the offshore subsea cables to the onshore underground cables. This cable system is necessary to export power from the offshore wind farm through the onshore substations to the existing grid network.
Landfall(s)		
6	Landfall(s)	The landfall is the point at which the offshore export cables cross from the marine environment through the intertidal zone to the terrestrial environment and connect to the onshore export cables via transition joint bays. A trenchless solution is to be implemented to install ducts. Whilst other trenchless methods are available, Horizontal Directional Drilling (HDD) (or similar trenchless technique) is assessed in the **EIA Report** and the RIAA. In relation to trenchless crossings, HDD has been presented in the **EIA Report**. Whilst other trenchless methods are available, HDD is presented herein as it is likely to have the largest construction footprint.
	Transition joint bay.	This is a component of the landfall where the offshore export cables connect with the onshore export cables. Transition joint bays are permanent, below ground infrastructure, where the offshore and onshore export cables are jointed together.
Onshore infrastructure		
7	Onshore export cables.	These are underground cables that connect from the landfall transition joint bays to the onshore substations. As with the offshore export cables, the type and number of cables will depend on the transmission technology used. Cables are typically installed in ducts in a standard buried trench arrangement where possible. A trenchless method may be necessary to cross sensitive features such as watercourses, roads and pipelines. Whilst other trenchless methods are available, HDD (or similar trenchless technique) is assessed in the **EIA Report**.
8	Onshore substations.	Three onshore substations are required to transform / convert the onshore export cable voltage to the 400 kilovolts (kV) required to connect to SSEN Netherton Hub.

Plate 2.1 ID	Component	Purpose / function
9	Grid connection cables.	These are the underground cables that connect from the proposed onshore substations to the grid connection point at SSEN Netherton Hub. These cables will be 400kV AC; compatible with grid requirements at the grid connection point. Cables are typically installed in ducts in a standard buried trench arrangement where possible. A trenchless method may be necessary to cross sensitive features such as watercourses, roads and pipelines. Whilst other trenchless methods are available, HDD (or similar trenchless technique) is assessed in the **EIA Report**.
	Grid connection.	The nominated 400kV SSEN substation at SSEN Netherton Hub into which the Project will connect, noting that SSEN Netherton Hub is a separate project and does not form part of the consenting applications that the EIA and the RIAA relate to.

Plate 2.1 Key components of the Project



2.5 Offshore elements of the Project

2.5.1 Overview

2.5.1.1 The offshore elements of the Project refer to works seaward of MHWS at the coast and will include the following key components:

- WTGs, including floating units (platforms and station keeping system);
- array cables;
- SDCs;
- subsea substations;
- offshore substations;
- RCPs (if required); and
- offshore export cables to connect the offshore infrastructure to the landfall(s).

2.5.1.2 These are described in this Section, with further information available in **Section 2.6**.

2.5.1.3 The Offshore Red Line Boundary is illustrated in **Volume 2, Figure 4.2** of the **EIA Report**. The design envelope for the key offshore components are provided in the following sections.

2.5.2 Wind turbine generators

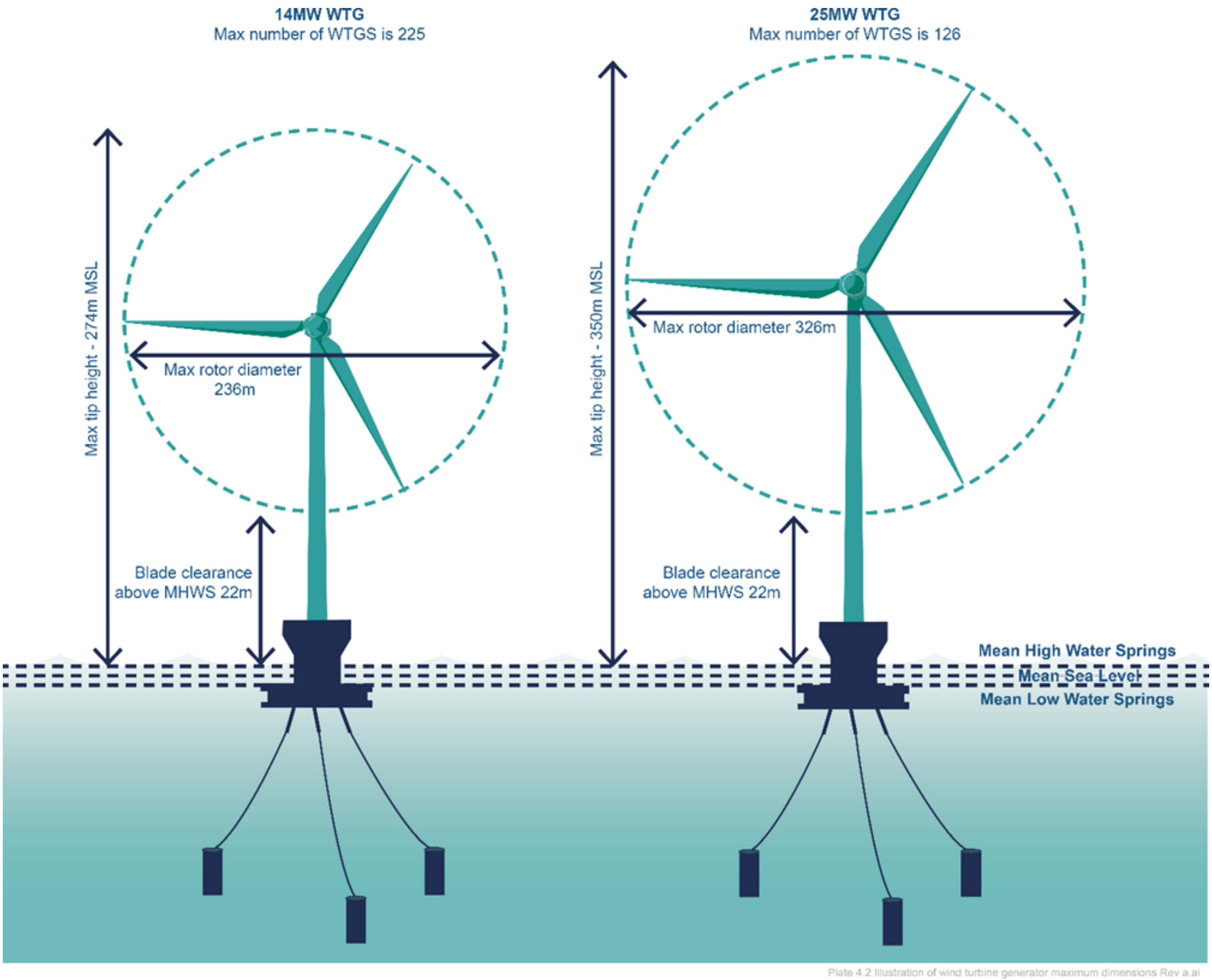
2.5.2.1 The maximum design scenario for the WTGs is provided in **Table 2.4** and illustrated in **Plate 2.2**.

Table 2.4 Wind turbine generator parameters

Parameters	Indicative design envelope	
Maximum turbine power output	14MW	25MW
Maximum number of WTGs	225	126
WTG hub height (to centreline of hub) (mean sea level) (MSL)	142m	182m
Operational wind speed (rotor cut-in / cut-out range)	3 / 28m/s	3 / 28m/s
Maximum rotor diameter	236m	326m
Rotor blade width	5.1m	10m
Rotor blade length	115m	155m
Number of blades per WTG	3	3
Rotation speed (min/max)	0 / 8rpm	0 / 7.62rpm

Parameters	Indicative design envelope	
Blade Pitch	3.5º	3.5º
Maximum rotor blade tip height (MSL)	274m	350m
Minimum rotor blade tip height (above MLWS)	260m	340m
Turbine colour	Assumed white	Assumed white
Blade clearance above MHWS	22m	22m
Navigational lighting	As required by Civil Aviation Authority (CAA), Maritime and Coastguard Agency (MCA).	As required by CAA and MCA.

Plate 2.2 Illustration of wind turbine generator maximum dimensions



2.5.3 Floating units

2.5.3.1 The WTGs will each be mounted on a floating unit, which will consist of a floating platform or "floating unit" that will be secured to the seabed by a dedicated "station keeping system". The station keeping system consists primarily of mooring lines and seabed anchors. Several design options are being considered for the floating unit. The final design concept will be identified following further market engagement, site survey and design development. The **EIA Report** considers a design envelope associated with a potential range of floating unit types. Three designs are currently being considered for the floating units: semi-submersible, barge and tension leg platform (as illustrated in **Plate 2.3** and **Plate 2.4**). However, any other hybrid design to take into account emerging or future technologies will also be considered.

2.5.3.2 **Table 2.5** provides the maximum design scenarios for the three types of floating unit described. Justification for the floating unit type selection considered within the design envelope is provided in **Volume 1, Chapter 3: Site Selection and Consideration of Alternatives** of the **EIA Report**.

Plate 2.3 Illustration of floating unit types considered

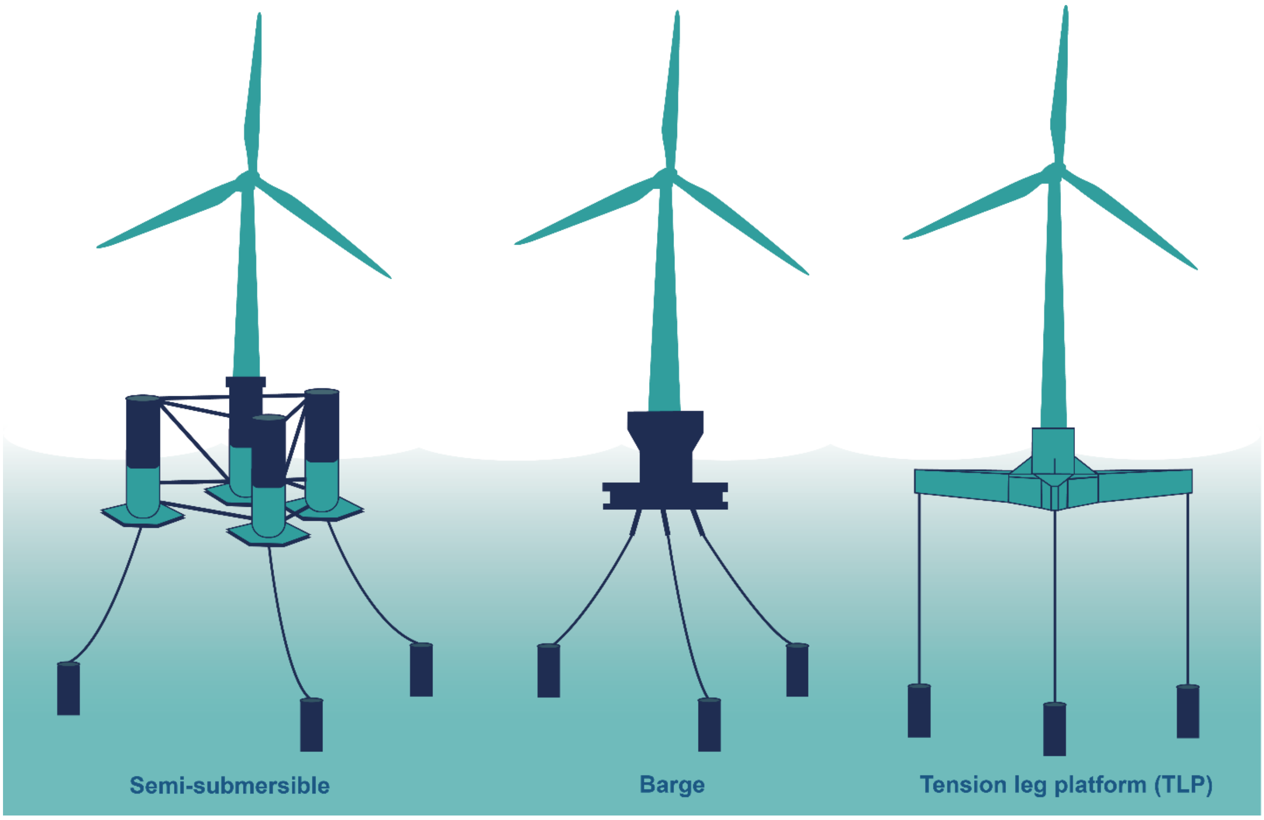


Plate 2.4 Floating platform key spatial parameters

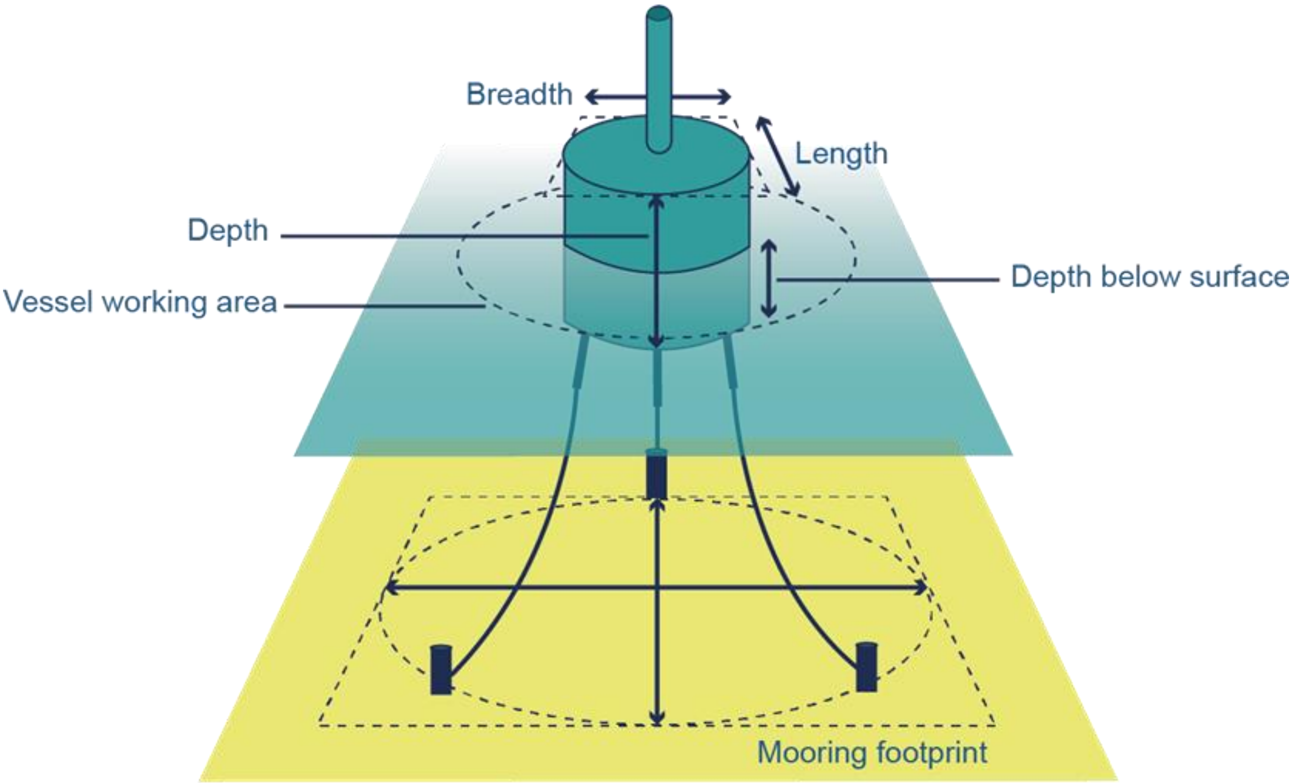


Table 2.5 Floating unit parameters

Parameters	Indicative design envelope
Floating unit concepts considered	Semi-submersible, barge, tension leg platform, or any other hybrid design to take into account emerging or future technologies.
Floating unit surface dimensions	100m x 120m maximum size of floating unit (relates to semi-submersible as worst case).
Floating unit shape	Rectangular, circular, triangular or hexagonal.
Floating unit minimum spacing from other structures	800m from centre of WTG to centre of nearest adjacent WTG. Minimum of 500m from WTG blade tip to offshore substation topsides.
Elevation above waterline	Minimum 15m to maximum 25m above MSL.
Floating unit cable location	Typically the base or one side of the floating unit.
Mooring line connection points	Connection point is likely to be below the surface at the base of the floating unit. Alternatively, it might be connected above the waterline.

Parameters	Indicative design envelope
Navigational safety lighting	All offshore infrastructure will have navigational safety lighting, the details of which will be agreed with key stakeholders (i.e. MCA and Northern Lighthouse Board) and as per International Association of Marine Aids to Navigation and Lighthouse Authorities Recommendation G1162 (IALA, 2021) via **Volume 4: Lighting and Marking Plan**.
Number of mooring lines per floating unit	Maximum of 8 (see Table 4.7 for further details on mooring lines).
Platform colour	As required by MCA.

Moorings

2.5.3.3 A key component of all floating unit designs is the mooring of the floating unit to anchor points on the seabed. The purpose of moorings is to maintain the position of the floating unit and WTG against the forces of wind and waves over the lifetime of the Project. Mooring lines may be made up of chain, synthetic fibre or steel wire elements or any combination of these.

2.5.3.4 **Table 2.6** provides the maximum design scenarios for the three types of mooring concept considered.

Table 2.6 Mooring parameters

Parameters	Indicative design envelope	
Mooring concepts considered	Catenary mooring, taut-line mooring, semi-taut mooring, vertical tendon mooring.	
Number of mooring line connection points	Semi-submersible floating unit.	Minimum 3, maximum 8 using catenary mooring or semi-taut moorings.
	Barge floating unit.	Minimum 3, maximum 8 using catenary mooring or semi-taut moorings.
	Tension leg platform floating unit.	Minimum 3, maximum 8 tendons.
Mooring footprint (max)	800m radius per individually moored floating unit (all mooring lines and mooring footprint will be within the OAA boundary).	
Total mooring footprint (max)	2,010,619m^2 / 2.01km^2	

Anchors

2.5.3.5 Anchoring is an integral part of the overall mooring system and there is a wide spectrum of anchoring solutions that could installed for the floating unit concepts identified above. These include drag embedment anchors, driven piles and suction anchors. Justification of the anchor type selection considered within the design envelope is provided in **Volume 1, Chapter 3: Site Selection and Consideration of Alternatives** of the **EIA Report**.

2.5.3.6 **Table 2.7** provides the scenarios for the three types of anchors considered.

Table 2.7 Anchor parameters

Parameters	Indicative design envelope (per anchor)
Drag embedment anchors	
Maximum length	12m
Width	12.5m
Height	7m
Height proud of seabed once fully installed	0m
Maximum seabed displacement	3,750m^2
Driven pile anchors	
Maximum pile length	30m
Pile diameter	3m
Maximum hammer energy	3,500 kilojoules (kJ)
Number of piles per day	Minimum of 1 and maximum of 2
Length of pile proud of seabed once fully installed	0.5m
Maximum seabed displacement	7.07m^2
Suction anchors	
Maximum pile length	20m
Pile diameter	6.5m
Length of pile proud of seabed once fully installed	0.5m
Maximum seabed displacement	33.18m^2

2.5.4 Array cables

2.5.4.1 Each array cable will be a single 3-core alternating current (AC) cable, constructed using a 'dynamic' cable design with additional mechanical protection. The cable can be described in two sections: a dynamic section required to move with the floating unit; and a static section, which will most likely be buried for protection.

2.5.4.2 The array cables will be up to 132kV dependant on size of WTG. The total maximum array cable length for the full 3GW expected to be up to 680km.

2.5.4.3 The maximum design scenario for the array cables is provided in **Table 2.8**.

Table 2.8 Array cable parameters

Parameters	Indicative design envelope	
	14MW WTG	**25MW WTG**
Proposed operating voltage	Between 66kV and 132kV.	Between 66kV and 132kV.
Number of cables	225	126
Secondary protection considered	Rock placement. Localised: concrete mattresses and bags.	Rock placement. Localised: concrete mattresses and bags.
Cable protection type, volume and location(s)	1,122,000m^3 of rock; or 22,666 mattresses; or a combination of both.	874,500m^3 of rock; or 17,667 mattresses; or a combination of both.
Total array cable length	680km	530km
Permanent array cable corridor swathe width (m) and area	3m width except for areas of rock placement where 15m is conservatively assumed. Area of 2.04km^2.	3m width except for areas of rock placement where 15m is conservatively assumed. Area of 1.59km^2.
Maximum extent of burial	680km (assuming 100% burial of total length of cable is possible).	530km (assuming 100% burial of total length of cable is possible).
Trench / disturbance width	30m per trench.	30m per trench.
Length of unburied cable	136km (assuming a worst case of 20% of cable length cannot be buried).	106km (assuming a worst case of 20% of cable length cannot be buried).

2.5.4.4 It is anticipated that there could be up to six crossings for array cables within the Project's OAA. Further information on cable crossings is provided in Section 4.6.12 of **Volume 1, Chapter 4: Project Description** of the **EIA Report**.

Subsea distribution centres and subsea substations

2.5.4.5 Concepts currently being considered for the Project are SDCs and subsea substations, both of which are installed on the seafloor. SDCs connects cables from multiple WTGs, allowing a star configuration of the WTGs and array cables. This benefits operational stage efficiency by maintaining transmission for WTGs in the star in the event of a failure in an array cable or WTG. Only the faulty cable or WTG would become off-line, with the remainder of the WTGs connected to the SDC continuing to generate.

2.5.4.6 Subsea substations are an alternative to tradition offshore HVAC fixed platform / topsides substation. They perform the same functionality in that they collect and transmit the electricity generated from the WTGs (see Section 4.5.5 of **Chapter 4: Project Description**) but will house different (typically less) equipment that on a topside platform. The electricity transmitted is in HVAC form.

2.5.4.7 The maximum design scenario for the SDCs and subsea substations is provided in **Table 2.9**.

Table 2.9 Subsea distribution centres and subsea substations parameters

Parameters	Indicative design envelope
Maximum number of SDC	45 (between five to eight array cables can be connected into one SDC).
Maximum dimensions of SDC (length x width x height)	18m x 8m x 5m
Maximum dimensions of SDC including cable protection (length x width)	38m x 28m
SDC construction footprint (length x width)	58m x 48m
Foundation type for SDC	Suction caisson / skirt and gravity base foundations.
Maximum number of subsea substations	Four
Maximum dimensions of subsea substation centres (length x width x height)	22m x 20m x 16m
Maximum dimensions of subsea substation including cable protection (length x width)	42m x 40m
Foundation type for subsea substation	Suction caisson / skirt and gravity base foundations.

2.5.5 Offshore substation

2.5.5.1 The WTGs will connect (via the array cables and SDC, if deployed) to substation platforms located within the OAA. It is anticipated that there will be up to four offshore substations associated with the Project. The offshore substations will transform generated electricity from the WTGs to a higher voltage for transmission to shore via offshore export cables. The location and extent of the offshore substations will be confirmed through detailed design process but will be located within the Red Line Boundary. The worst case locations have been considered for the purpose of the assessment. The offshore substations may be interconnected by link cables to deliver the combined output to a common export location, and for redundancy.

2.5.5.2 It is anticipated that the offshore substation platform foundations that will support the topside equipment will be either jacket secured by driven piles or suction caisson fixed foundations. The fixed design concept types being considered are shown in **Plate 2.5**.

2.5.5.3 The maximum design scenario for the offshore substations is provided in **Table 2.10**, including the foundation footprint sizes with the inclusion of scour protection, the form and scale of which would be decided either following geophysical and technical surveys and design phase of the Project and / or from post installation surveys.

Plate 2.5 Illustration of fixed foundation types

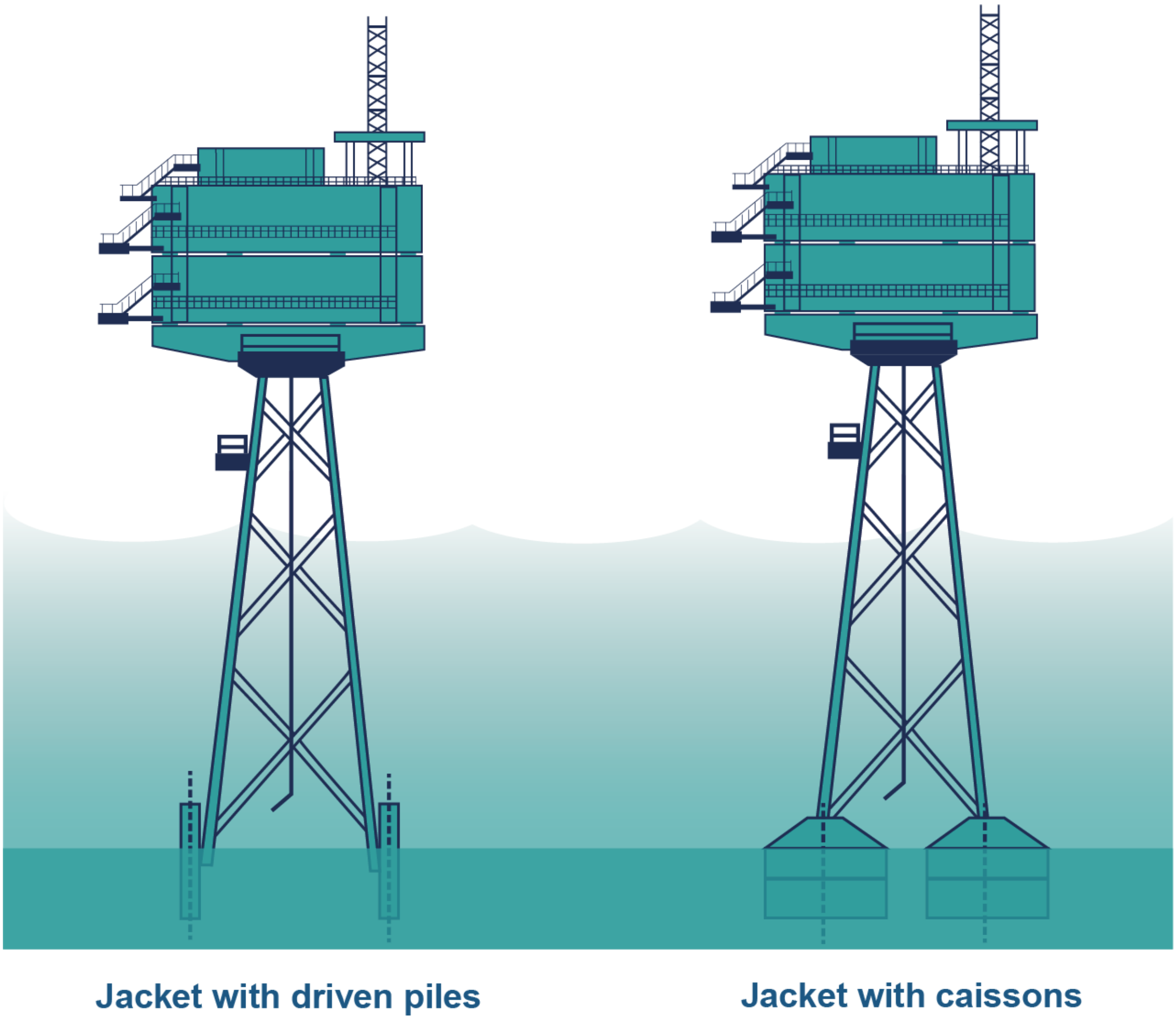


Table 2.10 Offshore substation parameters

Parameters	Indicative design envelope
Number of offshore substations	4
Water depth at proposed locations	Between 87.8m to 133.7m.
Offshore substation foundation type	Jacket foundations secured by driven piles or suction caisson.
Offshore substation shape	Rectangular or square topsides.
Minimum spacing to other structures	500m to other offshore substations. 500m from WTG blade tip to offshore substation topsides infrastructure.
Offshore substation topsides above-surface dimensions (maximum)	80m above lowest astronomical tide (LAT) (not including mast and lightning conductor and cranes). 100m above LAT (including mast and lighting conductor and cranes). 106m length 70m width
Offshore substation foundation above-surface dimensions	20m above LAT 80m length 60m width
Offshore substation foundation below-surface dimensions (maximum) (width x length)	80m x 60m
Minimum height above water	20m (height from LAT to main deck of topsides).
Driven piles length	95m
Number of driven piles in total	12 for each offshore substation.
Driven pile maximum diameter	3m
Driven pile maximum hammer energy	3,500kJ
Number of driven piles per day	Minimum of 1 and maximum of 2.
Length of pile proud of seabed once fully installed	0.5m
Offshore substations construction footprint	130m x 110m

Parameters	Indicative design envelope
Maximum seabed footprint (including scour protection)	110m x 90m
Scour protection types	Rock placement. Localised: concrete mattresses and bags.
Scour protection quantity per foundation	500m^3 per offshore substation.

2.5.6 Offshore export cables

2.5.6.1 The wind farm would be connected to the landfall(s) by a maximum of five offshore export cable circuits. Each will be laid in a separate trench in the seabed. They will connect to onshore export cables via a transition joint bay, that will connect via further cables onward to the onshore substations. The offshore export cables will consist of one copper or aluminium conductor with electrical insulation material, screens, communication fibre and protective armour layers at expected voltages of 275kV for HVAC and either +320kV or +525kV for HVDC (depending on what type of HVDC technology is deployed). Each export cable would have a fibre optic cable (FOC) either integrated within the cable or secured to the outside.

2.5.6.2 The offshore export cables will be typically buried 1m to 2m below the seabed for most of their length to the landfall(s) (see **Section 2.7** for further information), depending on the outcome of the cable burial risk assessment. The exact routing of the export cables within the offshore export cable corridor will be determined during the detailed design process of the Project, with consideration of seabed conditions and environmental sensitivities following pre-construction surveys.

2.5.6.3 The maximum design scenario for the offshore export cables is provided in **Table 2.11**.

Table 2.11 Offshore export cable parameters

Parameters	Indicative design envelope
Expected offshore export cable maximum voltage	275kV for HVAC. $\pm$320kV or $\pm$525kV for HVDC (depending on what type of HVDC technology is deployed).
Grid transmission route length offshore	130 to 140km depending on the offshore substation and landfall(s) location(s)
Number of offshore cable trenches (maximum)	5
Cable trench width	Up to 30m per trench.
Percentage of offshore export cable corridor considered suitable for burial	Target burial of 100% of offshore export cables.

Parameters	Indicative design envelope
Number of infrastructure crossings (max)	16 known crossings and an additional 6 (to take account of other developers export cables) within the offshore export cable corridor and 6 assumed crossings within the OAA.
Trench / disturbance width	30m per trench. 150m total.
Burial depth	The offshore export cables will be typically buried 1 to 2m below the seabed.
Separation distance between cable trenches	Closest distance will be three times the water depth along the offshore export cable route.
Permanent cable corridor swathe width and area	3m width except for areas of rock placement (20% of cable route) where 15m is conservatively assumed. Total area for 5 cable trenches is $21km^2$.
Cable protection type	Rock placement. Localised: concrete mattresses, bags or steel split pipe.
Cable protection locations	Worst case assumes 20% of length requires rock placement.
Cable protection berm dimension (height x width)	2m x 7m
Cable protection volume	$1,155,000m^3$
Dredging volume	$35,000m^3$

Electromagnetic fields and heat generated

2.5.6.4 The offshore export cables transmit electricity at a higher voltage than is used in the array cables.

2.5.6.5 Electromagnetic fields (EMF) emitted by HVAC offshore subsea cable are minimised by the arrangement of cable cores; three cores are laid together in trefoil and as the phase currents are balanced, the magnetic fields of the three cores tend to zero. The magnitude of the magnetic fields in the proximity of the cable is null and its presence in the sea bottom inert. Burial of the cable will also act to minimise emission of EMF.

2.5.7 Reactive compensation platforms (HVAC only)

2.5.7.1 Long distance, large capacity HVAC transmission systems may require RCPs to reduce the reactive power generated by the capacitance of the offshore export cable to improve power quality, voltage stability and transmission efficiency.

2.5.7.2 A maximum of two RCPs (if required) will be located within the offshore export cable corridor, typically between 40% to 60% of the total length from an offshore substation within the OAA to the onshore substations. Offshore export cables from the OAA would connect into the RCP before exiting the RCP and continuing to the landfall(s). While the location is not yet determined, the Applicant has included possible areas for installation of the structures within the Red Line Boundary and relevant consenting applications.

2.5.7.3 The final location of the offshore RCP(s) within the identified search area will be defined in the detailed design stage, post consent. The siting will take into account final electrical design, water depth, ground conditions, marine traffic, proximity to shore, other existing / planned infrastructure and other engineering and economic factors.

2.5.7.4 The RCPs will likely be paired in proximity to each other and may be connected by a bridge.

2.5.7.5 The design of an RCP would be similar to the offshore substations. This is likely to be a multi-tier topside module containing the RCP equipment, which is installed on a foundation structure. It is anticipated that the RCP foundations will be either jacket or suction caisson fixed foundations. The fixed design concept types being considered are shown in **Plate 2.5**.

2.5.7.6 The maximum design scenario for the RCP is provided in **Table 2.12**.

Table 2.12 Reactive compensation platform parameters

Parameters	Indicative design envelope
Number of RCPs (maximum)	2
Water depth range at proposed locations	73.74m to 110.53m.
RCP foundation type	Jacket foundations secured by driven piles or suction caisson.
Offshore RCP shape	Rectangular or square topsides.
Spacing separation distance between RCPs	50 to 150m
RCP topsides above-surface dimensions	80m above LAT (not including mast and lightning conductor and cranes). 100m above LAT (including mast and lighting conductor and cranes). 50m length 50m width
RCP foundation above-surface dimensions (length x width)	35m x 35m
Minimum height above water	20m LAT
Driven piles length	95m
Number of driven piles in total	4 for each RCP.

Parameters	Indicative design envelope
Driven pile maximum diameter	3m
Driven pile maximum hammer energy	3,500kJ
Number of driven piles per day	Minimum of 1 and maximum of 2.
Length of pile proud of seabed once fully installed	0.5m
RCP construction footprint	85m x 85m
Maximum seabed footprint (including scour protection)	65m x 65m
Scour protection types and quantity per foundation	Rock placement. Localised: concrete mattresses and bags.
Scour protection quantity per foundation	500m^3 per RCP
Closest distance to shore (MHWS) of RCP search area	31.85km

2.6 Offshore installation methodology

2.6.1 Overview

2.6.1.1 Construction of the offshore components of the Project will be completed in a number of stages. The stages are described sequentially below, although given the scale of the Project it is likely that some stages are undertaken in parallel in practice. The stages are described as follows (further information can be found in Section 4.6 of **Volume 1, Chapter 4: Project Description** of the **EIA Report**):

- pre-construction surveys and seabed preparation activities;
- anchor and mooring line installation;
- floating unit and wind turbine preparatory works;
- floating wind turbine towing to site;
- array cable and SDC installation;
- offshore platform foundation installation and piling;
- offshore platform topside installation;
- offshore export cable installation; and
- WTG commissioning.

2.6.1.2 Equipment and offshore installation activities will be designed to avoid the need for divers wherever possible. However, in some instances this may not be possible and diver operations may be undertaken subject to the appropriate procedures and risk assessment.

2.6.2 Access and logistics for construction

2.6.2.1 The number and specification of vessels employed during the construction of the Project would be determined by the appointed marine contractor and in line with the construction strategy. It is anticipated that several types of construction vessel could work in parallel during the construction period.

2.6.2.2 Indicative vessel types required during the construction and operation stages are shown in **Table 2.13**. The vessel estimates are based on the construction of three phases delivering a total of 3GW installed capacity, in accordance with the outline construction programme. Overlaps between phases have been included where appropriate.

Table 2.13 Indicative vessel requirements at construction stage

Activity	Vessel type	Indicative number	Round transits[1]
Offshore substations foundation installation	Heavy lift vessel.	1	12
	Support vessel.	5	90
	Barge (if required).	1	12
Floating units towage	Anchor handling tug supply (AHTS) vessel.	3	675
Floating units installation / mooring hook up	AHTS vessel.	5	1125
Cable installation for the offshore export cable corridor	Survey vessel (pre- and post-lay).	1	20
	Cable lay vessel.	1	70
	AHTS vessel (for trenching / bounder removal / pre-lay grapnel run / UXO removal).	2	40
	Offshore construction / larger AHTS vessel (for sand wave clearance).	2	40
	Rock placement vessel.	2	80 to Norway
Cable installation for the array cables	Survey vessel (pre- and post-lay).	2	60
	Cable lay vessel.	2	50
	AHTS vessel (for trenching).	2	80

[1] A transit is defined as a single uninterrupted journey either from port to worksite or from worksite to port. Each leg of the journey constitutes one transit. Therefore, for a single operation where a vessel departs from port, performs work offshore, and returns to port, this would be classed as two transits. This definition applies to vessel movements only; helicopter movements are referred to separately as ‘trips’.

Activity	Vessel type	Indicative number	Round transits[1]
	Rock placement vessel.	2	30 to Norway
Anchor installation	Offshore construction vessel / larger AHTS.	2	675
Mooring line installation	Offshore construction vessel.	2	144
	AHTS vessel.	2	675
Support vessels	Guard vessel.	2	208
	Service operation vessel (SOV).	2	208
	Support vessel.	3	312

2.6.2.3 It is anticipated that approximately 10 vessels would be on site at any one time during the construction of the Project. The numbers of vessels will be confirmed with further input from construction contractors post-consent.

2.6.2.4 It is estimated that approximately 3,838 individual vessels transits (each representing a one-way journey between port and worksite) would be required during the construction of the Project. It is estimated that the installation of each floating unit will require up to three vessel transits of the installation vessel.

2.6.2.5 Upon arrival at the offshore worksite, installation vessel(s) may require repositioning within the field to complete the installation procedure. Following completion of the procedure, the vessel(s) may undertake a return transit to port.

2.6.2.6 The routing of vessel trips will depend upon the final selection of the port facilities required to construct and operate the Project, which has not yet been determined.

2.6.2.7 There may also be a requirement for helicopters to travel to and from the OAA to assist with construction activities. Helicopters will largely be used to transfer personnel in between port visits and to any accommodation vessels but may also be used for construction materials or to support specific construction activities. It is estimated that two helicopter trips per week for duration of the main offshore construction, approximately 1,040 helicopter round trips may be required during the offshore construction period. The helicopter port or airfield location has not yet been determined but is expected to be Aberdeen bases on facilities at time of writing.

2.7 Landfall(s)

2.7.1.1 The landfall is the point at which the offshore export cables cross from the marine environment through the intertidal zone to the terrestrial environment and connect to the onshore export cables.

2.7.1.2 The landfall(s) infrastructure will be constructed in three phases, to align with the phased installation of the offshore export cables and energisation of the WTGs. Further information on the indicative construction programme for landfalls is provided in **Section 2.9**.

2.7.1.3 The key works for landfall(s) construction above and below MHWS are listed below.

2.7.1.4 Landfall(s) works landward of MLWS include:

- construction of access to the landfall(s) and landfall(s) temporary construction compound;
- establishment of a landfall(s) temporary construction compound;
- drilling of bores for cable ducts (24-hour working);
- installation of ducts into the bores;
- construction of transition joint bays;
- pull-in of offshore export cables into ducts from the cable lay vessel;
- jointing of offshore cables to onshore export cables in transition joint bays;
- backfilling of transition joint bays; and
- demobilisation of site and reinstatement works.

2.7.1.5 Landfall works seaward of MHWS include:

- marine support during drilling of bores;
- marine support during installation of ducts;
- marine support during pulling in of offshore cables into ducts;
- installation of cable protection systems (if required); and
- burial / protection of duct ends and offshore cables in duct vicinity.

2.7.1.6 To reduce the environmental impact of the landfall, a trenchless solution is to be implemented to install ducts. Whilst other trenchless methods are available, HDD (or similar trenchless technique) is presented herein as it is likely to have the largest construction footprint. Determination of the most suitable trenchless landfall crossing method will be undertaken during the detailed design stage of the Project, following geotechnical investigation of the onshore and nearshore areas.

2.7.1.7 The proposed indicative design envelope for key characteristics of the Project landfall(s) are summarised in **Table 2.14**.

Table 2.14 Landfall(s) parameters

Parameters	Indicative design envelope
Landfall(s) location	Up to 3
Number of HDD (or similar trenchless technique) cable ducts	Up to 8 (including 1 spare duct / bore).
Number of transition joint bays	Up to 7
Transition joint bay: width, length and depth	3.5m x 12m x 2.5m
Link box: width, length and depth	1m x 3m x 1.5m
FOC junction box: width, length and depth	1m x 3m x 1.5m

Parameters	Indicative design envelope
Landfall(s) temporary construction compound: length and width	Up to 345m x 70m (combined area for all three phases).

2.7.2 Landfall works above MHWS

2.7.2.1 Further details on landfall construction are provided in sections 4.7.2 and 4.7.5 of **Volume 1, Chapter 4: Project Description** of the **EIA Report**.

2.8 Onshore elements of the Project

2.8.1 Overview

2.8.1.1 The onshore elements of the Project relate to the onshore electricity grid connection infrastructure, landward of MLWS. The key components are:

- landfall(s) – the infrastructure associated with landfall(s) located above MLWS is explained in Section 4.7.2 of **Chapter 4: Project Description** of the **EIA Report**;
- underground onshore export cables running from the landfall(s) to the onshore substations;
- onshore substations co-located on one site;
- underground grid connection cables (connecting the onshore substations to the grid connection point at SSEN Netherton Hub); and
- tie-in to the grid connection point (SSEN substation at the Netherton Hub, which is a separate project and does not form part of the consenting applications which the EIA relates to).

2.8.1.2 The location of the onshore infrastructure is presented in **Volume 2, Figure 4.1** of the **EIA Report** and the key components of the onshore infrastructure of the Project are described in **Section 2.8.3**.

2.8.2 Onshore export cable corridor

2.8.2.1 The onshore export cable corridor will include the underground export cables to be installed between the landfall(s) and the three proposed onshore substations co-located at the onshore substation site, and from the onshore substations to the point of connection at SSEN Netherton Hub (see **Volume 2, Figure 4.1** of the **EIA Report**). The onshore export cables will be installed in three phases to align with the energisation of the WTGs.

2.8.2.2 The onshore export cables for Phase 1 will be either laid directly in trenches or cable ducts will be installed and the onshore export cables for Phase 1 installed into the ducts. In Phase 1 cable ducts will also be installed to enable the later phase cables (Phases 2 and 3) to be installed without having to re-excavate along the entire route. The joint bays, required to connect each section of onshore export cable to the next, will be constructed in three phases, to align with the phased installation of associated onshore export cables. The temporary construction corridor is generally routed as straight as possible to reduce overall length and to facilitate the pulling of cables into ducts.

2.8.2.3 In the event that more than one landfall is required, the connecting onshore export cables, from the common onshore export cable corridor to the additional landfall(s), may be laid in trenches or installed in ducts to align with the phased installation of the landfalls.

2.8.2.4 See **Section 2.9**, for further information on the phased installation of the onshore export cables.

2.8.2.5 Design refinement of the onshore infrastructure since the Scoping stage is described in **Volume 1, Chapter 3: Site Selection and Consideration of Alternatives** of the **EIA Report**.

2.8.2.6 The proposed indicative design envelope for key parameters of the onshore export cable corridor are summarised in **Table 2.15**.

Table 2.15 Indicative onshore export cable corridor parameters

Parameters	Onshore export cable corridor from the landfall(s) to the onshore substations	Onshore export cable corridor from the onshore substations to SSEN Netherton Hub
Voltage	275kV – 400kV (HVAC) ±320kV – ±525kV (HVDC)	400kV
Number of cable circuits	Up to 5	Up to 7
Number of onshore export cables	Up to 19 onshore export cables - based on 4 HVAC circuits (each with 3 power cores and 1 FOC) and 1 HVDC circuit (2 power cores and 1 FOC).	Up to 28 onshore export cables - based on up to 3 power cables in each circuit (plus one FOC for each circuit).
Maximum number of trenches	Up to 6	Up to 7
Typical trench width: at base	Up to 1m	
Typical trench width: at surface	Up to 4m dependant on soil strength. Maximum angle of trench dependant on soil strength.	
Typical trench depth	Up to 1.5m, dependent on ground conditions.	
Typical depth to top of buried infrastructure (ducts)	0.9m to 1.2m	
Number of ducts (including fibre optics)	Up to 19	Up to 28
Corridor width: permanent (servitude)	Up to 61m	Up to 71m
Corridor width: temporary construction corridor width	Up to 89m	Up to 99m

Parameters	Onshore export cable corridor from the landfall(s) to the onshore substations	Onshore export cable corridor from the onshore substations to SSEN Netherton Hub
Onshore export cable corridor length	11.0km	2.35km
No. of expected trenchless crossings (as per Crossing Register, Volume 3, Appendix 4.1 of the EIA Report)	9	2

2.8.2.7 **Plate 2.6** illustrates a typical onshore export cable configuration and temporary construction corridor cross-section for the onshore export cable corridor from the landfall(s) to the onshore substations.

2.8.2.8 **Plate 2.7** illustrates a typical onshore export cable configuration and temporary construction corridor cross-section for the onshore export cable corridor from the onshore substations to SSEN Netherton Hub.

Plate 2.6 Typical construction corridor cross-section for the onshore export cable corridor from the landfall(s) to the onshore substations

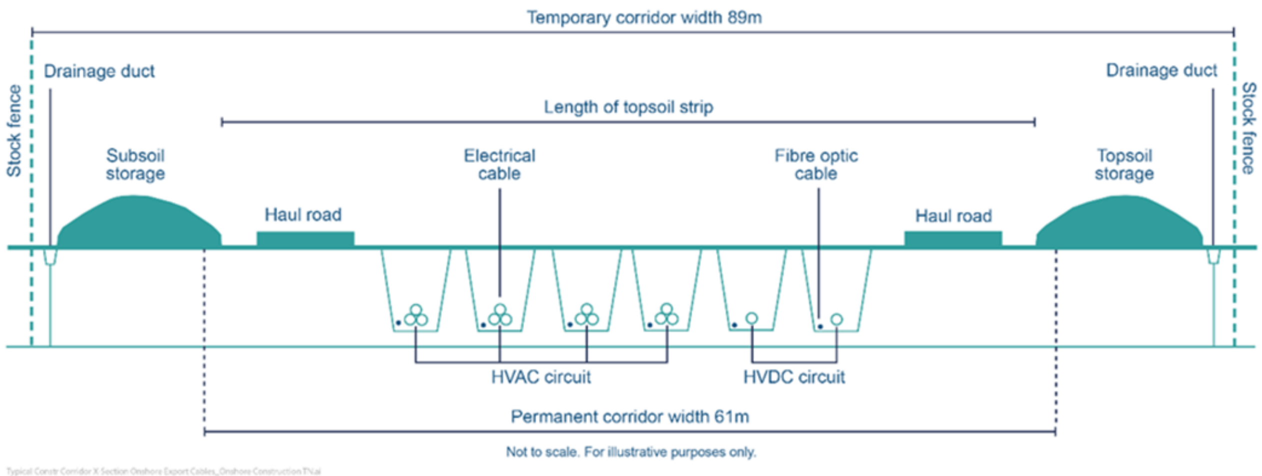
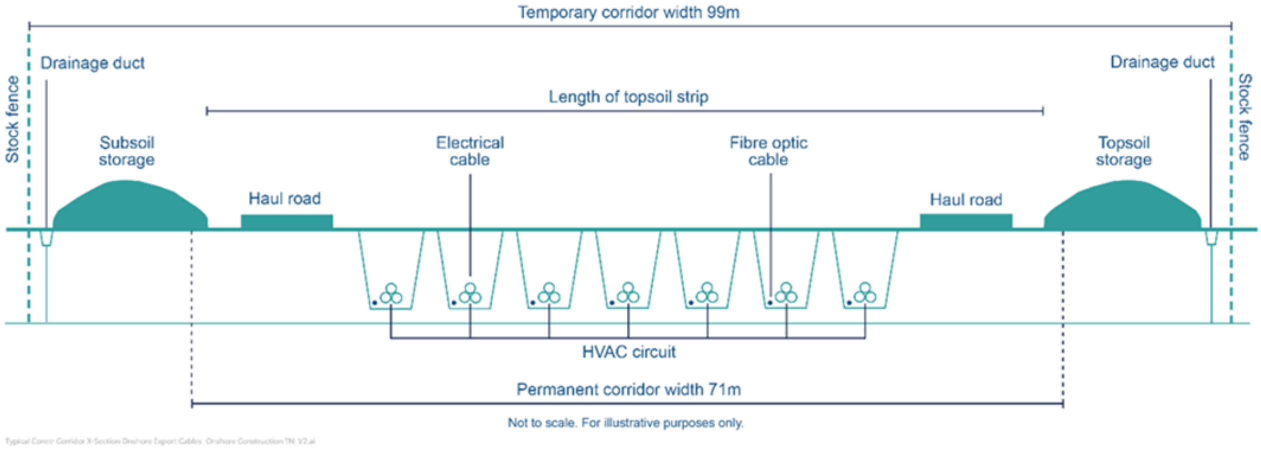


Plate 2.7 Typical construction corridor cross-section for the onshore export cable corridor from the onshore substations to SSEN Netherton Hub



Joint bays and cable jointing

2.8.2.9 The joint bays are subsurface structures with an associated link box and FOC junction box that will be accessible at surface level. These link boxes enable electrical checks and testing to be carried out on the cable system during operation and maintenance.

2.8.2.10 In all cases, the joint bays will be sited within the footprint of the onshore export cable corridor.

2.8.2.11 The locations of the joint bays for each Phase will be determined during the detailed design stage. Onshore cabling is typically provided on drums of 1,000m in length, although can be provided in differing lengths ranging from 500m up to 2,000m. Typically, joint bays are located every 600m to 1,000m, however the location depends on factors such as crossings, bends, access and / or the need to avoid surficial or sub-surface features. **Plate 2.8** presents an illustration of a typical joint bay arrangement.

2.8.2.12 **Table 2.16** provides maximum indicative design assessment assumptions for joint bays.

Plate 2.8 Illustration of a typical joint bay arrangement

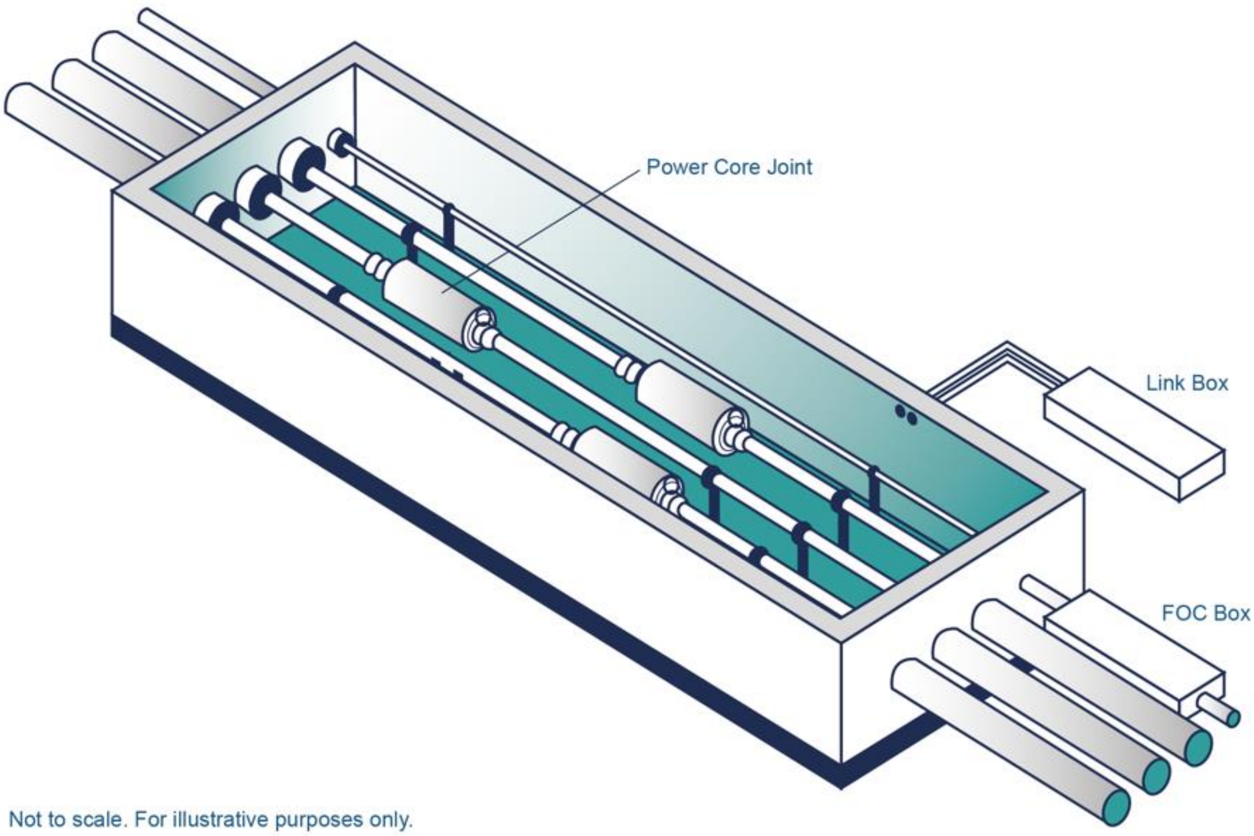


Table 2.16 Joint bay, link box and FOC junction box design parameters

Parameters	Onshore export cable corridor from the landfall(s) to the onshore substations	Onshore export cable corridor from the onshore substations to SSEN Netherton Hub
Approximate number of joint bay locations	8 to 24	2 to 6
Number of joint bays per location	At each joint bay location, along the onshore export cable corridor from the landfall(s) to the onshore substations, there are up to 6 joint bays.	At each joint bay location, along the onshore export cable corridor from the onshore substations to SSEN Netherton Hub, there are up to 7 joint bays.
Joint bay: width, length and depth	3m x 9m x 2m	
Link box: width, length and depth	1m x 3m x 1.5m	
FOC junction box: width, length and depth	1m x 3m x 1.5m	

Parameters	Onshore export cable corridor from the landfall(s) to the onshore substations	Onshore export cable corridor from the onshore substations to SSEN Netherton Hub
Joint bay construction duration per location (does not include cable pulling duration)	6 to 10 weeks.	

Cable clamping

2.8.2.13 If the onshore export cable corridor encounters steep slopes, or if there is a risk of lateral movement of the ducts during cable pull-in, cable / duct clamping may be required. The cable itself is heavy and high mechanical loads can be generated in the cable at the top part of slopes by virtue of the cable wanting to travel down the slope under its own weight. In particular, these high mechanical loads can be subsequently transferred to the nearest adjacent joint and cause it to fail.

2.8.2.14 To mitigate the risk of movement, cable clamping may be applied at certain locations, typically close to joint bay locations on the side where the downward slope occurs. This would involve the installation of concrete block (approximately $2m^3$ in volume) into an excavated pit below the planned burial depth of the cable. Bolted to the concrete block would be a number of metal cleats, through which each of the cables would pass. These cleats clamp the cables to the concrete block, arresting any movement.

2.8.2.15 Once installed, the ground above these clamping arrangements will be reinstated as per the same specification as the rest of the onshore export cable corridor.

Crossings

2.8.2.16 There is road, watercourse, footpath, third party services, and other crossings along the onshore export cable corridor. Each crossing will be individually reviewed / surveyed again during detailed design to confirm the crossing method to be employed. Crossing techniques are broadly classified as “open cut”, in which the onshore export cable trenches continue across the feature, or “trenchless”, under which different cable installation methods are employed, but all have the aim of avoiding trenching through the feature.

2.8.2.17 Further information is provided in Section 4.8.2 of **Volume 1, Chapter 4: Project Description** of the **EIA Report** for each method installation. A crossings schedule is provided in the **Volume 3, Appendix 4.1: Crossings Register** of the **EIA Report**.

Temporary construction access and haul roads

2.8.2.18 Temporary construction access points from the road network are required along the onshore export cable corridor to allow the transportation of materials, equipment, and personnel to and from the construction areas. These temporary construction access points will allow access to the temporary construction corridor, via temporary construction access roads, and subsequently the temporary construction haul road running along the onshore export cable corridor, except for locations where there are trenchless or road crossings. **Volume 2, Figure 4.1** of the **EIA Report** presents the indicative locations of all the proposed temporary construction access points along the onshore export cable corridor. Key assessment assumptions for the temporary construction access and haul roads are presented in **Table 2.17**.

Table 2.17 Maximum access road and construction haul road parameters

Parameters	Indicative design envelope
Temporary access roads and construction haul road width	Approximately 6m.
Aggregate depth	Approximately 0.3m.

Primary construction compounds

2.8.2.19 Along the onshore export cable corridor up to three sites have been identified as locations for primary construction compounds. These compounds are expected to include:

- material storage for use on the onshore export cable corridor including cable drums and cable ducting;
- storage for topsoil stripped during compound establishment;
- perimeter fencing (typically wooden hoarding up to 2.4m high);
- site security hut and access gate;
- storage and maintenance area for plant and machinery;
- CBS batching plant;
- waste facilities including space for separation of recyclable materials;
- fuel and chemical storage including bunding;
- office space including portacabins;
- parking spaces for construction vehicles, site workers and visitors; and
- welfare facilities for site workers.

2.8.2.20 Primary construction compounds would be required for the duration of the installation of the Phase 1 cables and associated joint bays and construction of continuous ducts for the later installation of the onshore export cables and joint bays required for Phases 2 and 3. Indicative locations are shown in **Volume 2, Figure 4.1** of the **EIA Report**.

2.8.2.21 Following completion of constructions works, the primary construction compound facilities will be removed, and each compound site will be returned to its original state. Primary construction compound details are provided in **Table 2.18**.

Table 2.18 Primary construction compound parameters

Parameters	Indicative design envelope
Number of primary construction compounds	Up to 3.
Primary construction compounds (length and width)	Up to 125m x 125m.
Aggregate depth	Approximately 0.3m.

Secondary construction compounds

2.8.2.22 Secondary construction compounds are required along the temporary construction corridor to support the installation of the onshore export cable and associated trenchless crossings and joint bays. The secondary construction compounds are used to provide laydown areas for construction equipment and materials, and / or to provide parking and welfare facilities for site workers. The secondary construction compounds will comprise crushed aggregates and a geotextile membrane.

2.8.2.23 All secondary construction compounds are located within the proposed planning application boundary and indicative locations are shown in **Volume 2, Figure 4.1** of the **EIA Report**.

2.8.2.24 Following completion of constructions works, the secondary construction compound facilities will be removed, and each compound site will be returned to its original state. Secondary construction compound details are provided in **Table 2.19**.

Table 2.19 Secondary construction compound parameters

Parameters	Indicative design envelope
Number of secondary construction compounds	Up to 6.
Temporary secondary compound dimensions (length and width)	Up to 100m x 100m.
Aggregate depth	Approximately 0.3m.

Pre-construction

2.8.2.25 Pre-construction activities are 'onshore site preparation works' to secure and prepare all sites and access for the construction activities. These operations consist of:

- site clearance;
- demolition, where necessary;
- pre-planting of landscaping works;
- archaeological investigations, which may include intrusive investigations including archaeological trial trenching, as described in **Volume 4: Outline Onshore Written Scheme of Investigation** of the **EIA Report**;
- environmental surveys in accordance with **Volume 4: Outline Construction Environmental Management Plan** of the **EIA Report**;
- investigations for the purpose of assessing ground conditions;
- pre-construction surveys (utility surveys, UXO surveys, watercourse bed and water level surveys etc.)
- remedial work in respect of any UXO, contamination or other adverse ground conditions;
- diversion and laying of services;
- erection of any temporary fencing or other means of enclosure to mark out the onshore export cable corridor area;

- creation of site accesses; and
- the temporary display of site notices or advertisements.
- Vegetation will be cleared, where appropriate, from the working width of the onshore export cable corridor at the appropriate time of year.

Construction

2.8.2.26 Construction along the onshore export cable corridor will be performed with the commitment to a safe work site and to minimise potential impacts as much as practicable. Generally, where possible construction will take place during daylight hours with a requirement only for local task lighting. The high-level construction sequence for Phase 1 is as follows:

- stripping of topsoil;
- excavate all trenches;
- lay Phase 1 onshore export cables in trenches or, where appropriate connect ducts and place the ducts in the trenches;
- connect ducts and place the ducts in the trenches for later installation of onshore export cables in Phases 2 and 3;
- safety measures such as warning tape and protective tiles are buried above the cable ducts to flag the presence of the cable to anyone digging in the area;
- trenches will be backfilled with an initial layer of fine protective material, overlaid by warning tiles and excavated subsoil; and
- reinstatement of the topsoil.
- In parallel to the above sequence, the joint bays, FOC junction boxes (FOC JB) and link boxes required for Phase 1 will be constructed. This involves:
- excavation; and
- associated civil works.

2.8.2.27 Following completion of the construction joint bays, FOC JB, and link boxes, associated with Phase 1, the joint bays, FOC JB, and link boxes will be backfilled and the associated construction area reinstated, leaving access to the surface mounted link boxes for future O&M.

2.8.2.28 Joint bays, FOC joint bay and link boxes for Phases 2 and 3 will be constructed prior to installation of the relevant phase onshore export cables. The process and stages followed will be broadly identical to Phase 1 joint bay construction, with the exception that it will be necessary to cut out a section of continuous (pre-installed) ducting at each joint bay location. See Section 4.9 of **Chapter 4: Project Description**, for further information on the phased installation of the onshore export cables.

2.8.2.29 Where onshore export cables are installed in pre-laid ducts, each cable is pulled from one joint bay to the next. Onshore export cables will be installed sequentially in 3 phases, with a gap between the installation of export cables to align with the energisation of the WTGs.

2.8.2.30 Testing will be performed to confirm the integrity of each section of installed cable. This sequence repeats for all cables along the entire length of the onshore export cable corridor. Once the onshore and offshore cable installation is complete final testing / commissioning will be undertaken.

2.8.2.31 Access to all construction sites will be managed throughout the construction stage with suitable supervision provided at access points to the onshore export cable corridor, and temporary construction compounds. Access to all construction sites will be managed by the construction contractor. Where open cut trenching methodology is used for road crossings, traffic management will be in operation.

Construction lighting regime for the onshore export cable and onshore substations

2.8.2.32 External lighting of the construction site for both the onshore export cables and the new onshore substations will be directional. The work will usually be scheduled during daylight hours. If night or 24-hour working is required, such as may be required during trenchless crossing operations, then portable directional task lighting will be deployed. Further detail regarding construction lighting is provided in **Volume 4: Outline Construction Environmental Management Plan**. External lighting of the construction site will be designed and positioned to:

- provide the necessary levels for safe working;
- minimise light spillage and / or light pollution; and
- avoid disturbance to adjoining residents / occupiers of buildings and to wildlife.

2.8.2.33 Site or welfare cabins, equipment and lighting will be sited to minimise visual intrusion as far as is consistent with the safe and efficient operation of the work site. Implementation will comply with the requirements set out in the following standards and guides as far as it is reasonably practicable and applicable to construction works:

- British Standards (BS) Institution, (2014). BS EN 12464-2:2014 Light and lighting. Lighting of work places. Outdoor work places;
- Institute of Lighting Professionals, (2021). Guidance Note 1 for the Reduction of Obtrusive Light;
- Chartered Institute of Building Services Engineers (CIBSE), (2018). *Society of Light and Lighting Guide 1: The Industrial Environment*; and
- CIBSE, (2016). Society of Light and Lighting Guide 6: The Exterior Environment.

2.8.2.34 Further details regarding lighting during the construction stage will be developed with the construction contractor.

Construction equipment

2.8.2.35 Typical construction equipment utilised in the installation of the onshore export cable corridor would include:

- tracked / backhoe excavators;
- bulldozers;
- wheeled loaders;
- articulated dump trucks ;
- forward tipping dumpers;
- mobile cranes;
- drilling rigs and associated equipment spreads;
- water pumps and filter units;

- winches;
- cable reel trailers;
- duct fabrication equipment;
- large concrete mixers;
- concrete trucks and equipment;
- rollers and compaction equipment;
- telescopic handlers;
- generators; and
- tower lights.

2.8.3 Onshore substations

2.8.3.1 Three onshore substations will be co-located within the onshore substation site, one for each Project phase. The three onshore substations will accommodate a total combined capacity of 3GW. The purpose of the new onshore substations is to transform / convert the onshore export cable voltage to the 400kV required to connect to the proposed SSEN Netherton Hub and to house the HVDC and HVAC electrical components required to ensure the offshore wind farm export power is compliant with UK Grid Code (NESO, 2023) at the time of connection. The onshore export cables will be routed to each of the onshore substations and from the onshore substations to the point of connection at SSEN Netherton Hub.

2.8.3.2 **Volume 2, Figure 4.1** of the **EIA Report** identifies the location of the onshore substation site and the indicative location of the three onshore substations which is based on maximum permanent footprint and two site access roads to enable access to each of three onshore substations. The three onshore substations will be built sequentially to align with the phased energisation of the WTGs. Further information on the indicative construction programme for the construction of the onshore substations is provided in **Section 2.9**.

2.8.3.3 The maximum permanent footprint of the proposed onshore substations will be, collectively, up to 15ha within the onshore substation site boundary. The remaining site area includes permanent access roads and a combination of landscape and ecological mitigation and drainage works, as shown for the onshore substations in **Volume 4: Outline Landscape and Architectural Strategy** of the **EIA Report**.

2.8.3.4 At this stage, a decision has not been made on whether the electrical components and equipment necessary to connect the electricity generated by the Project to the national electricity transmission network will be fully housed in buildings or whether this equipment will be partially placed outdoors, incorporating sufficient mitigation to meet the necessary noise limits. The onshore substations include the following buildings, electrical components and equipment:

- STATCOM Hall;
- STATCOM Compensation Transformer;
- Super Grid Transformer (400 / 275kV);
- 275kV Shunt Reactor (SHR);
- 275 & 400kV GIS Hall;
- 275kV GIS Hall;

- 400kV GIS Hall;
- Control Room;
- 275kV Harmonic Filter Building;
- 400kV HF;
- 400kV SHR;
- HVDC Converter Hall;
- Power line carrier Filter, AC Switchgear and HF Building;
- Spare Parts Building; and
- Car parking.

2.8.3.5 Whether the onshore substations electrical components and equipment are fully housed in buildings, or this equipment is partially placed outdoors, the three onshore substations will be subject to the maximum design parameters presented in **Table 2.20**.

Table 2.20 Indicative onshore substation parameters

Parameters	Indicative design envelope – fully enclosed onshore substations	Indicative design envelope – partially enclosed onshore substations
Permanent combined onshore substation site footprint	Up to 15ha.	
Typical onshore substation foundation depth	600mm	
Permanent access roads	Approximately 700m in length and 6m wide.	
Temporary construction compound	Up to 3.06ha.	
Maximum building height for HVAC electrical infrastructure	Up to 17.5m.	
Maximum building height for HVDC electrical infrastructure	Up to 30m.	
Maximum number of buildings	Up to 35.	Up to 12.
Maximum building length	Up to 104m.	Up to 91m.
Maximum building width	Up to 88m.	Up to 88m.
Maximum height of external electrical infrastructure for HVAC	N/A	Up to 12m.
Maximum height of external electrical infrastructure for HVDC	N/A	Up to 16.6m.
Lightning protection mast height	Up to 32m	

Parameters	Indicative design envelope – fully enclosed onshore substations	Indicative design envelope – partially enclosed onshore substations
Duration of construction	Onshore substation 1 – up to 3 years. Onshore substation 2 – up to 3 years. Onshore substation 3 – up to 3 years.	

Onshore substation site construction

2.8.3.6 Further details on onshore substation site construction are provided in Section 4.8.3 of **Volume 1, Chapter 4: Project Description** of the **EIA Report**.

2.8.4 Onshore grid connection export cables

2.8.4.1 An onshore export cable corridor is required from the proposed onshore substations to the grid connection point at SSEN Netherton Hub (see **Volume 2, Figure 4.1** of the **EIA Report**). The construction methodology for the grid connection cables will be the same as described for the onshore export cables from the landfall(s) to the onshore substations.

2.9 Project construction programme and construction timings

2.9.1 Construction programme

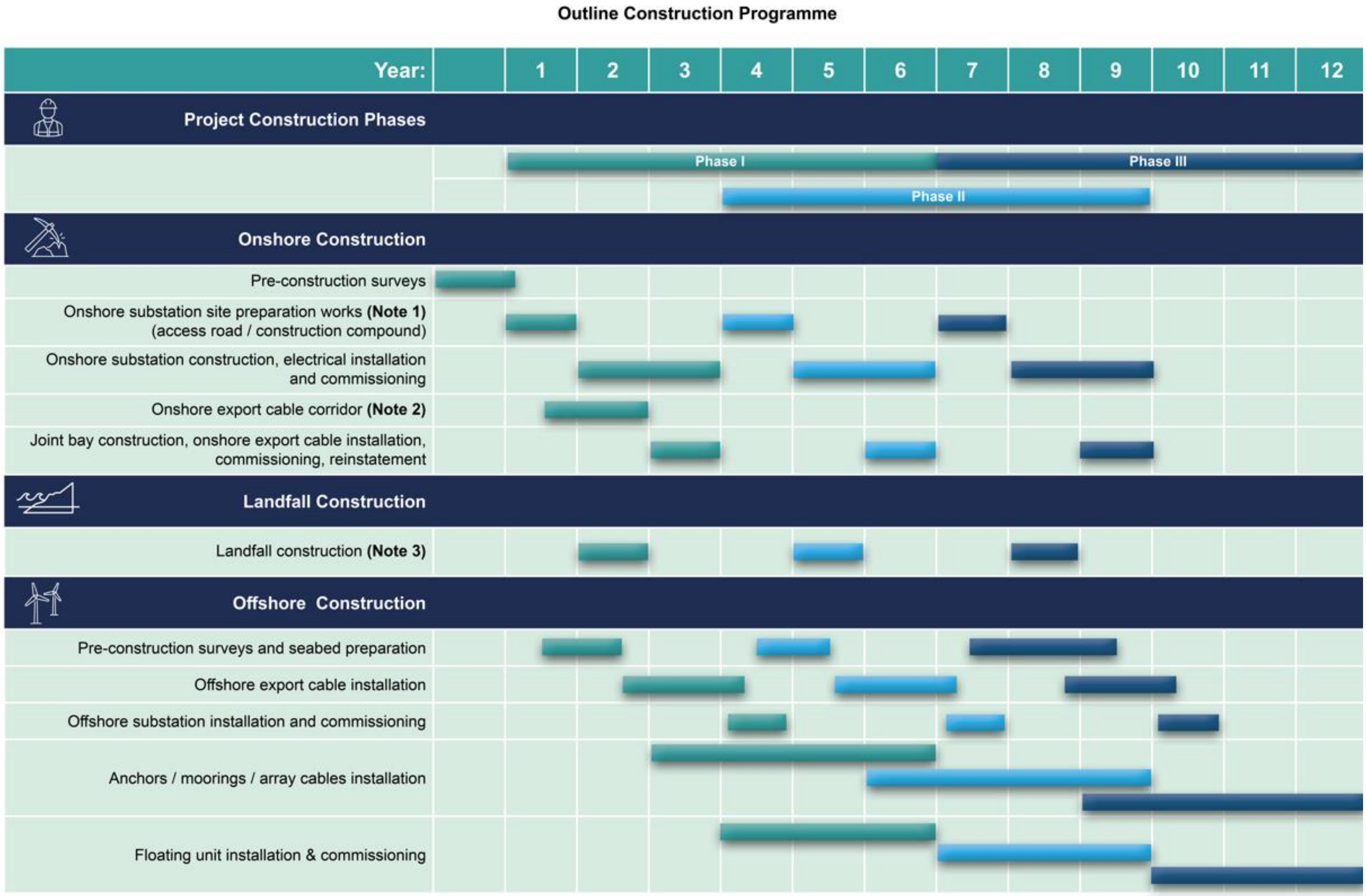
2.9.1.1 An indicative construction programme for the Project is presented in **Plate 2.9**. The programme illustrates the anticipated duration of the main construction / installation activities by infrastructure component.

2.9.1.2 The overall duration of construction of the offshore infrastructure is anticipated to be up to 12 years. This will be subject to the final grid connection date, supply chain discussions and further site surveys (pre-consent).

2.9.1.3 A shorter period within the twelve years is expected for construction of the onshore infrastructure; in the range of up to nine years.

2.9.1.4 The Project will be delivered in phases, which are reflected in the indicative construction programme. It is anticipated that construction of the Project would commence in 2030.

Plate 2.9 Indicative construction programme



Note 1: Permanent roads built as part of first phase onshore substation build. No further permanent roads required as part of second & third phases.
Note 2: Includes site preparation works (access / haul roads, construction compounds), cable trenching, horizontal directional drilling works and duct installation for all Project phases.
Note 3: Includes site preparation works (access road / construction compound), transition joint bay construction, horizontal directional drilling works and associated duct installation.

2.9.2 Construction timing

2.9.2.1 As secured in **Volume 4: Outline Environmental Management Plan** of the **EIA Report** the worst-case expected working hours offshore would be 24 hours a day subject to relevant marine law and watch keeping.

2.9.2.2 As secured in **Volume 4: Outline Construction Environmental Management Plan** of the **EIA Report**, core working hours for onshore construction works for the Project are as follows:

- 08:00 to 18:00 hours Monday to Friday; and
- 08:00 to 13:00 hours on Saturday.

2.9.2.3 Prior to and following the core working hours Monday to Friday, a ‘shoulder hour’ for mobilisation and shut down will be applied (07:00 to 08:00 and 18:00 to 19:00) for which restrictions are described further in **Volume 4: Outline Construction Environmental Management Plan** of the **EIA Report**. No activity outside of these hours, including Sundays, public holidays or bank holidays will take place apart from under the following circumstances:

- where continuous periods (up to 24-hours, seven days per week) of construction work are required for HDD (or similar trenchless technique);
- for other works requiring extended working hours such as concrete pouring which will require the relevant planning authority to be notified at least 72 hours in advance;
- for the delivery of abnormal loads to the connection works, which may cause congestion on the local road network, where the relevant highway authority has been notified prior to such works 72 hours in advance; or as otherwise agreed in writing with the relevant planning authority.

2.10 Operation and maintenance stage

2.10.1 Introduction

2.10.1.1 It is anticipated that the first phase of the Project would become fully operational in 2037 following commissioning of the WTGs for phase 1. It is anticipated the second phase of the Project would become fully operational in 2040 and the third phase in 2043. The operational lifetime of the Project for each phase is expected to be around 35 years.

2.10.1.2 It is the Applicant’s intention to have fully operational phases in the dates outlined above, subject to the reasons outline in Section 4.2.2 of **Chapter 4: Project Description**.

2.10.1.3 O&M activities can be divided into two main categories:

- scheduled maintenance; and
- unscheduled maintenance.

2.10.2 The Applicant’s operation and maintenance strategy

2.10.2.1 The developer is responsible for the O&M activities associated with the generating assets. However, as per the Electricity Act 1989, a generator may not own the transmission system. As such the offshore substations and offshore export cables will be sold to an Offshore Transmission Operator (OFTO), who will be accountable for O&M of the Offshore Transmission assets.

2.10.2.2 After commissioning, and in line with the Electricity Act 1989, the ownership of the offshore substation, RCPs and associated infrastructure to shore, including the onshore substation, will be transferred to a separate third party OFTO. As such it is necessary to keep the flexibility open for different O&M requirements.

2.10.2.3 The overall O&M strategy will be finalised once the O&M base location and technical specifications of the offshore elements are known. A monitoring, inspection and maintenance plan will be put in place to ensure the integrity of all offshore infrastructure associated with the Project. Maintenance requirements will depend on the infrastructure used, depending on the type of wind turbine, floating platforms, electrical transmission infrastructure and final layout of the wind farm. Maintenance and repair operations will typically be undertaken via service operation vessel (SOV). Where necessary, helicopters or other specialised vessels may also be used. Twenty-four-hour operations within the OAA and along the offshore export cable corridor is normal but will be assessed for safety considerations if transfer of personnel is required outwith daylight hours.

Key operation and maintenance requirements

- **Remote monitoring**: The wind farm will be equipped with advanced monitoring systems that will provide real-time data on its performance and condition. This data will be analysed to identify trends, predict potential failures, and optimise maintenance schedules.
- **Preventive maintenance**: A proactive maintenance program will be established to prevent failures and minimise downtime. This will involve scheduled replacement of components, cleaning, lubrication, and calibration of equipment.
- **Corrective maintenance**: In the event of unexpected failures or malfunctions, prompt corrective maintenance will be performed to restore functionality. This may involve repairs, component replacements, or system adjustments.
- Where scour protection had been employed during the initial construction stage, this may be replenished during operation via the addition of fresh material on top of existing scour protection areas should it be required.

Frequency of operation and maintenance activities

2.10.2.4 The frequency of O&M activities will vary depending on the specific component or system. Some tasks may be performed daily (for example remote monitoring), while others may be scheduled annually or less frequently (for example component replacements). The O&M plan will outline the specific frequency for each activity based on manufacturer recommendations, industry best practices, and operational experience, but will not be finalised for the transmission assets until the OFTO transfer is complete.

Offshore surveys

2.10.2.5 Offshore surveys will be undertaken on an ongoing basis throughout the O&M stage, which may include geophysical surveys to monitor the condition of the seabed and subsea infrastructure, depth of burial surveys using acoustic or electromagnetic survey techniques to monitor the condition of buried cables, and visual inspections via remotely operated vessel.

2.10.2.6 Seabed surveys of the OAA will also typically be performed. The timing of the inspection or monitoring of the infrastructure will be subject to further assessment during detailed design phase. However, as there is a up to 12 year construction stage, vessels will be in the vicinity to complete spot checks where necessary.

2.10.2.7 The survey schedule for the remaining lifetime of the wind farm will be determined after the first surveys. This schedule should include, as a minimum, two further surveys over the remaining lifetime of the wind farm. Depending on site conditions, additional or rescheduled monitoring following a major storm event. Depending on site conditions, additional or rescheduled monitoring following a major storm event may be carried out.

Operation and maintenance commitments

2.10.2.8 The Project is committed to ensuring the long-term reliability and performance of the wind farm through a comprehensive and well-planned O&M strategy. This strategy will be designed to minimise environmental impact while maintaining operational efficiency.

2.10.2.9 A rigorous Health and Safety Management Plan will be developed to ensure the well-being of personnel during O&M activities. This plan will be created in accordance with industry best practices and guidelines, including the Offshore Wind and Marine Energy Health and Safety Guidelines and Work Health and Safety on Offshore Wind Farms - Special Report 310 and will also take account of best practices and guidelines from other relevant industries.

2.10.2.10 O&M activities will be conducted in a manner that minimises environmental impact. This includes the development of a Waste Management and Disposal Plan, EMP and Emergency Response Plans amongst others.

2.10.2.11 The Project will engage with stakeholders as necessary to ensure transparency and address any concerns related to O&M activities. Regular updates and open communication channels will be maintained to foster good relationships and community support.

2.10.2.12 Continuous improvement will be a key focus, with regular reviews and updates to the O&M strategy based on operational experience and technological advancements. This adaptive approach will help ensure the wind farm remains efficient, safe, and environmentally responsible throughout its operational life.

2.10.3 Operation and maintenance activities for wind turbine generators

Overview

2.10.3.1 The following O&M activities are expected to occur in relation to the floating WTGs:

- replacement of consumable items (for example lubricants);
- routine inspections;
- blade repairs and / or replacements;
- gear box replacements;
- other minor repairs;
- painting or other protective coatings; and
- visual inspections.

2.10.3.2 Regular maintenance activities will primarily be carried out offshore with the WTG in situ. For MCR, it may be necessary to tow the WTG / floating unit assembly to port, particularly in the early years of floating wind farm operation. Emerging technologies are being considered and developed that would remove the need for tow to port and allow MCR to be undertaken offshore. ROVs, tow vessels, cable vessels and anchor handler vessels may be used in the case of MCR, which is anticipated to occur on an unscheduled basis (i.e. as required).

2.10.3.3 It is assumed that the majority of the activities will be carried out using SOVs and associated daughter craft.

2.10.3.4 It is currently anticipated that any large O&M activities, including MCR will take place at a local O&M port or harbour facility. The process would follow a reverse of the installation approach. It is anticipated that the following indicative steps will be followed to undertake any major O&M works:

- disconnect and unhook the array cable(s) and wet store these on or buoyed above the seabed;
- ballasting of the floating foundation (if required);
- disconnect the mooring lines from the floating foundation and wet store on or buoyed above the seabed; and
- tow the turbine to a suitable O&M facility using anchor handling tugs, or similar. It is expected that a quayside mounted crane, or a suitable alternative, will be used to undertake any MCRs. Ballasting and de-ballasting at the quayside may also be required.

2.10.3.5 Following completion of O&M works, the WTG will be towed back to the WTG location within the OAA. Mooring lines would be reconnected; the turbine foundation would be ballasted (as required) and the array cable will be pulled into the WTG and reconnected.

2.10.3.6 Other O&M strategies would be considered including solutions that do not require towing to port.

Floating units

2.10.3.7 The following O&M activities are expected to occur in relation to the floating units:

- routine inspections;
- repairs or replacements of navigational equipment and other ancillary equipment including condition monitoring equipment;
- removal of marine debris (for example lost fishing gear);
- application of paint or other protective coatings and corrosion protection measures;
- modification or replacement of ancillary structures such as access ladders and boat landings;
- replacement or repair of mooring line components and hardware such as rope, links, chain buoyancy aids and / or clump weights where necessary; and
- replacement or repair of array cables.

2.10.3.8 It is assumed that the majority of these activities will be carried out using SOVs and ROVs, which may include uncrewed surface vessels (USVs), and tug vessels, with appropriate equipment for the activity to be undertaken.

2.10.3.9 The Project's design basis is to avoid the use of divers, but it may be necessary in special cases. These will then use diving support vessels (DSVs) to support operations.

2.10.3.10 It is assumed that the majority of these O&M activities will be routinely scheduled throughout the lifetime of the OAA. The frequency of O&M activities will be dependent on the findings of routine inspections.

Array cables

2.10.3.11 The following O&M activities are expected to occur in relation to the array cables:

- routine inspections;
- geophysical surveys;
- cable repair by recovering the cable from its trench or water column and making the necessary repairs.
- reburial of sections of cable that have become exposed;
- ancillary equipment repair or replacement; and
- replacement of cable protection over sections of the cable identified as in need of protection.

2.10.3.12 During the O&M stage of the Project, the offshore array cables and any buoyancy or other fittings will be periodically inspected for any maintenance and repair needs. O&M activities will be conducted using a variety of vessels commonly employed in the offshore industry, including USVs, SOVs, ROVs and cable-laying vessels. Divers and DSVs may utilise when necessary for specialised tasks. The majority of these activities are expected to be routinely scheduled throughout the operational lifespan of the Project.

Moorings and anchors

2.10.3.13 A monitoring, inspection and maintenance plan will be put in place to ensure the integrity of the mooring system.

2.10.3.14 The mooring lines may need to be periodically re-tensioned during the lifetime of the wind farm due to creep / stretching. Depending on which floating units and mooring systems are selected, re-tensioning would require either a single anchor handling vessel or an offshore construction vessel and support vessels to provide access.

2.10.3.15 Where anchors or mooring lines need to be replaced, the existing mooring line will be disconnected from the floating unit and a new line installed and hooked up to the floating substructure using the same process as used during construction.

2.10.3.16 Debris, including lost fishing gear will also be monitored via ROV, with debris and excessive growth or colonisation of marine biota removed intermittently. As with the floating substructures, some of the mooring system ancillaries (ancillaries may include permanent and temporary buoyancy or clump weights) may be painted in a low-toxicity anti-fouling paint to reduce the build-up of marine growth.

Subsea distribution centres and subsea substations

2.10.3.17 The following O&M activities are expected to occur in relation to SDC and subsea substations:

- routine inspection by ROV;
- geophysical surveys;
- removal of marine growth;
- replacement of corrosion protection anodes;
- replacement of equipment / connections;
- cable repair or replacement; and

- replacement of scour protection (if fitted).

2.10.3.18 As subsea substations will be sold to an OFTO after commissioning, the associated O&M activities will be confirmed by the OFTO that takes ownership of the assets.

2.10.4 Operation and maintenance activities for offshore platforms

2.10.4.1 As the offshore platforms will be sold to an OFTO after commissioning, the following O&M activities may be reasonably anticipated but will be confirmed by the OFTO that takes ownership of these assets.

Offshore platform topsides

2.10.4.2 The following O&M activities are expected to occur in relation to the offshore substation topsides:

- routine inspections;
- removal of avian guano;
- replacement of consumables and electrical transmission components; and
- painting and other coatings.

Operation and maintenance activities for offshore substations and reactive compensation platforms

2.10.4.3 The following O&M activities are expected to occur in relation to the offshore substation and RCP jacket foundations:

- routine inspections;
- geophysical surveys;
- repairs and replacements of navigational equipment and other ancillary equipment including condition monitoring equipment;
- removal of marine growth;
- replacement of corrosion protection anodes;
- application of painting or other protective coatings;
- replacement of access ladders and boat landings;
- modifications to or replacement of J and I-tubes; and
- replacement of scour protection.

2.10.5 Operation and maintenance activities for offshore export cables

2.10.5.1 As the offshore export cables will be divested to an OFTO after commissioning, the following O&M activities may be reasonably anticipated but will be confirmed by the OFTO that takes ownership of these assets.

2.10.5.2 The following O&M activities are expected to occur in relation to the offshore export cables:

- routine inspections;
- geophysical surveys;

- cable repair by recovering the cable from its trench / water column and making the necessary repairs;
- reburial of sections of cable that have become exposed;
- ancillary equipment repair; and
- replacement of cable protection over sections of the cable identified as in need of protection.

Offshore export cable corridor repairs and maintenance

2.10.5.3 Further details on offshore export cable corridor repairs and maintenance are provided in Section 4.11.5 of **Volume 1, Chapter 4: Project Description** of the **EIA Report**.

2.10.6 Landfall(s) operation and maintenance

2.10.6.1 Scheduled and unscheduled maintenance in relation to the transition joint bays and the associated landfall(s) section of the onshore export cables is covered in **Section 2.10.7**.

2.10.6.2 Where a repair is required to a section of offshore export cable inside a landfall duct the following process would take place:

2.10.6.3 A new section of offshore cable would be installed across the landfall, either using the original duct (if the faulty cable inside can be successfully removed) or using a duct installed as spare during the original landfall(s) construction stage. Either way, the faulty cable section would need to be disconnected at the transition joint bay and cut at the offshore end at a suitable distance from the end of the duct and in water deep enough to allow repair vessel access. The cut end would be sealed and buoyed for later recovery and laid down ("streamed") on the seabed.

2.10.6.4 As with the original export cable installation campaign, the replacement section would be pulled through the empty duct from a cable repair vessel stationed at the offshore duct end to the onshore transition joint bay. This would require mobilisation of a winch and associated equipment at the onshore end as with the original installation of cables at the landfall.

2.10.6.5 At the offshore end, the replacement cable would then need to be jointed to the streamed end of the offshore export cable. The repair vessel would lay away from the duct end until it reached the position of the streamed end. The end would be recovered to deck, and both ends would be cut, tested and prepared for jointing. An offshore joint would then be completed.

2.10.6.6 The repaired cable would be re-laid back on the seabed as close to the original cable position as possible, noting that the cable route will now be characterised by an omega (Ω) shape loop laid down approximately perpendicular to the direction of the cable route. Once in position, the cable will be inspected and reburied using jetting or covered by external cable protection where burial cannot be achieved.

2.10.6.7 The replacement landfall cable would be jointed to the onward onshore export cable at the relevant transition joint bay (the faulty cable connection having been removed).

2.10.7 Onshore infrastructure operation and maintenance

2.10.7.1 Maintenance of the onshore export cable between the landfalls and the onshore substations is expected to be minimal. During O&M, periodic testing of the cable is likely to be required (every two to five years). This will require access to the link boxes at defined inspection points along the onshore export cable corridor. Unscheduled maintenance or emergency repair visits will typically involve attendance by up to three light vehicles, such as vans, in a day at any one location. The vehicles will gain access using existing field or site access points to reach the relevant sections of the onshore export cable.

2.10.7.2 At the onshore substations, unscheduled maintenance or emergency repair visits will typically involve a very small number of vehicles, typically light vans. Infrequently, equipment may need to be replaced, where this is required the use of an occasional HGV may be utilised, depending on the nature of the repair.

2.10.7.3 Inspection and minor servicing may be required for the electrical plant, but it is anticipated that the onshore substations will require minimal scheduled maintenance and operation activities.

2.10.7.4 It is anticipated that a monthly inspection of the electrical infrastructure will be required. Maintenance of the buildings is anticipated to be carried out annually, with maintenance of electrical infrastructure being carried out during onshore substation outage periods, typically every few years. Access to the onshore substations will be via the permanent access road/s, up to 6m in width, as identified in **Volume 2, Figure 4.1** of the **EIA Report**.

2.10.7.5 Lighting during O&M activities is expected to be minimal. External lighting will be directional and limited to essential security and safety requirements. External works will usually be scheduled during daylight hours. If night working is required, then portable directional task lighting will be deployed.

2.10.7.6 Foul drainage at the onshore substations would be collected in either of the following ways:

- mains connection discharging to the Scottish Water sewer system, if available; or
- septic tank located within the onshore substation site boundary.

2.10.7.7 The preferred method for controlling foul waste would be determined during detailed design and will depend upon the availability and cost of a mains connection and the number of visiting hours staff would attend site.

2.10.7.8 For the onshore export cable between the onshore substations and the point of connection at SSEN Netherton Hub, scheduled and unscheduled maintenance or emergency repair visits will follow the same process as for the onshore export cable between the landfall(s) and the onshore substations described above.

2.11 Decommissioning stage

2.11.1 Offshore decommissioning

Overview

2.11.1.1 The approach to decommissioning of the offshore infrastructure will be completed in line with any relevant guidance and legislation at the time of decommissioning. It is however currently expected that all infrastructure above the seabed will be removed. Any infrastructure below the seabed will be assessed to determine if less impactful (from an environmental perspective) to remove or leave in position. This is particularly relevant where new habitats have developed during the O&M stage of the Project.

2.11.1.2 A Decommissioning Programme will be developed post consent but prior to construction. It will be updated during the operational stage of the Project to account for any changes to industry best practice, relevant legislation, guidance and policy, or developments in technology.

2.11.1.3 Once decommissioned, all components will be reused or recycled where possible.

Offshore infrastructure

2.11.1.4 The dismantling of turbine components, such as blades, nacelle, and tower, will primarily follow the reverse order of the installation process (see **Section 2.6**). These operations are expected to take place at the quayside, where they can be managed under controlled conditions.

2.11.1.5 The removal and dismantling of the floating units will largely be the reversal of the installation process (**Section 2.6**). Decommissioning will be undertaken in the same controlled manner as the installation process and in accordance with a risk management plan to ensure the same level of safety and pollution measures.

2.11.1.6 The floating unit will be towed to port (expected to be combined with the WTG. After the WTG is removed, the floating unit may be repurposed or taken to an alternative site or port suited to decommissioning larger structures. In this instance the floating units will be dismantled and recycled.

2.11.1.7 Mooring lines will be fully removed from site. Anchors will be removed where feasible, practicable and less environmentally impactful to do so than leaving in position. In cases where anchors are to be left in situ, best practice shall be adopted to ensure environmental and other marine users are considered.

2.11.1.8 The approach for decommissioning the array cables on the seabed is yet to be determined. This will be reviewed throughout the lifetime of the Project, and good practice guidance at time of decommissioning will be followed.

2.11.1.9 The dynamic portion of the array cables within the water column will be fully removed. If there are no issues with stakeholders / regulators and the risk of the cables becoming exposed is minimal, then the static buried cables (and relevant cable protection) may be cut and left in situ to avoid disturbing the seabed unnecessarily.

2.11.1.10 The ends of the cables will be cut as close to the seabed and weighted down for burial to ensure there is no interference with trawling and other users of the sea. A decision to decommission infrastructure in situ will be supported by a comparative assessment process in line with the Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) (2025) and Scottish Government guidance (Scottish Government, 2022).

2.11.1.11 The decommissioning methodology is anticipated to involve the removal of all offshore infrastructure above the seabed. This is relevant to the SDCs, offshore substations, and RCPs. Driven piles if used would be cut at seabed level to enable removal of the foundations.

2.11.1.12 Further details on the decommissioning of the offshore infrastructure are provided in Section 4.12 of **Volume 1, Chapter 4: Project Description** of the **EIA Report**.

Offshore export cables

2.11.1.13 Offshore export cables may be left in-situ or removed from the seabed. Relevant stakeholders and regulators will be consulted prior to decommissioning to establish which sections of the offshore export cables will require removal. If it is not required by stakeholders / regulators and the risk of the cables becoming exposed is minimal, then the cables (and relevant cable protection) may be cut and left in situ to avoid disturbing the seabed unnecessarily.

2.11.1.14 The ends of the cables will be cut as close to the seabed and weighted down for burial to ensure there is no interference with commercial fishing activities and other users of the sea.

A decision to decommission infrastructure in situ will be supported by a comparative assessment process (in line with the OPRED, 2025 and Scottish Government, 2022).

2.11.1.15 Further details on the decommissioning of the offshore export cables are provided in Section 4.12 of **Volume 1, Chapter 4: Project Description** of the **EIA Report**.

Decommissioning ports

2.11.1.16 The Applicant will endeavour to use Scottish and UK ports with an indicative shortlist of ports considered for the decommissioning of the Project provided in **Volume 1, Chapter 4: Project Description** of the **EIA Report**.

2.11.2 Onshore decommissioning

Overview

2.11.2.1 The decommissioning stage will commence at the end of the operational lifetime of the Project. The decommissioning duration of the onshore infrastructure may take the same amount of time as construction of the Project, up to 9 years, although this indicative timing may reduce. Materials would be reused or recycled, where possible, with the remainder of any material to be disposed with a licensed waste disposal site.

2.11.2.2 Prior to decommissioning taking place, an onshore decommissioning plan will be submitted and agreed Aberdeenshire Council before decommissioning works commence, following cessation of commercial operation.

Onshore export cables

2.11.2.3 It is anticipated that the onshore electrical cables will be left in-situ with ends cut, sealed and buried to minimise environmental effects associated with removal. The underground structures of the joint bays, FOC junction boxes and link boxes will be removed only if it is feasible with minimal environmental disturbance or if their removal is required to return the land to its current agricultural use. It should be noted that, whilst this is the current assumption, the regulations and practice applicable at the time of planning for decommissioning will be reviewed and followed. Further detail will be provided in an onshore decommissioning plan, prepared prior to the start of any decommissioning activities.

Onshore substations

2.11.2.4 The onshore substations and associated access roads will be removed and the site reinstated. The decommissioning works are likely to be undertaken in reverse to the sequence of construction works and involve similar types and levels of equipment and vehicles. The onshore substation site will be restored to its original state or made suitable for an alternative use. Further detail will be provided in an onshore decommissioning plan, prepared prior to the start of any decommissioning activities.

3. The HRA Process and Summary of HRA Screening

3.1 Legislative context for Habitats Regulations Appraisal

3.1.1.1 Council Directives 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora ('the Habitats Directive') and 2009/147/EC on the conservation of wild birds ('the Birds Directive') provided the designation of sites for the protection of certain species and habitats. The sites designated under these Directives are collectively termed European sites (also referred to collectively as designated sites) and form part of a network of protected sites across Europe, originally known as the Natura 2000 network.

3.1.1.2 Since January 2021, the Natura 2000 network is now referred to in the UK as the National Sites Network. Any references to Natura 2000 in the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 ('the 2019 Regulations') and in guidance now refer to the new National Site Network. For the purposes of this RIAA, they are referred to collectively as 'designated sites'.

3.1.1.3 In Scottish territorial waters, the Habitats Directive was initially translated into specific legal obligations by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended by the 2019 regulations) and the Conservation of Habitats and Species Regulations 2017 (as amended) in respect of reserved matters. The Conservation of Offshore Marine Habitats and Species Regulations 2017 are also relevant in Scottish waters more than 12 nautical miles (nm) from land. These regulations are together referred to as the Habitats Regulations for the purposes of this Report.

3.1.1.4 The Conservation of Habitats and Species Regulations 2017 (as amended) is one of the key pieces of domestic legislation that transposes the land and marine aspects of the Habitats Directive (Council Directive 92/43/EEC), as well as certain elements of the Birds Directive (Directive 2009/147/EC), collectively known as the Nature Directives, into UK law. Amendments to these regulations were made by the Conservation of Habitats and Species (Amendment) (European Union (EU) Exit) Regulations 2019 to ensure that the transposition of the Habitats and Birds Directives into UK law remains effective.

3.1.1.5 In line with EU Exit guidance issued by the Scottish Government, the terms "European site", "European marine site", and "European offshore marine site" have been retained, as have "Special Area of Conservation" (SAC) and "Special Protection Area" (SPA), to refer to sites protected in European Member States, Scotland, and the rest of the UK (Scottish Government, 2020a). However, where these sites are located within the UK, they now form part of the National Site Network, which covers both inshore and offshore marine areas as well as terrestrial sites. The National Site Network includes all existing SACs and SPAs, as well as any new sites designated under these regulations. Scottish Government policy also affords the same level of protection to proposed SACs and SPAs that have been approved by Scottish Ministers for formal consultation. European sites are also referred to as designated sites in this RIAA, its supporting documents, and in stakeholder comments received for the Project.

3.1.1.6 The UK Government is also a signatory to the Convention on Wetlands of International Importance 1971 ('the Ramsar Convention'). The Ramsar Convention provides for the listing of wetlands of international importance. UK Government policy is to give sites listed under this convention ('Ramsar Sites') the same protection as Designated sites in the National Site Network. NPF4 acknowledges the significance of Ramsar Sites within Policy 4 – Natural Places. It is of note that Policy 4 also extends protection for a proposed SAC or proposed SPA as if they were designated.

3.1.1.7 For the purposes of this RIAA, in line with the Habitats Regulations and relevant Government policy, the terms 'Designated sites' and National Site Network include SACs, candidate SACs, possible SACs, SPAs, potential SPAs, listed and proposed Ramsar Sites and sites identified or required as compensatory measures for adverse effects on any of these sites.

3.1.1.8 Each Designated site is designated as a SAC, classified as an SPA, or listed as a Ramsar Site in respect of specific 'qualifying features'. These 'qualifying features' (i.e. habitats, mosaics of habitats, species or assemblage of species, and combinations of these) are the reasons for which the site is designated.

3.1.1.9 For SPAs the qualifying features are the birds for which the SPA is classified, under either:

- Article 4(1) rare and vulnerable species, species in danger of extinction or requiring particular attention because of their habitat needs, listed in Annex I of the Birds Directive; or
- Article 4(2) regularly occurring migratory species (e.g. on passage or over-wintering or an internationally important assemblage of birds) not listed in Annex I.

3.1.1.10 The qualifying features of SACs are the habitats listed in Annex I of the Habitats Directive and the species listed in Annex II of the Directive. The Habitats Regulations include powers to amend the annexes to the Habitats and Birds Directives (to the extent that they apply to the Habitats Regulations) and schedules of the Habitats Regulations. In relation to the 1994 Regulations, these powers are for the Scottish Ministers. In relation to the Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017, these powers are for the Secretary of State. Such amendments add species listed in Annex IV of the Habitats Directive where their natural range includes any area in Scotland (on land and in inshore and offshore waters) and reflect advances in technology and scientific understanding. This provides equivalent powers to those held by the European Commission.

3.1.1.11 The 'qualifying features' of Ramsar Sites are the list of Criteria as set out in the Convention on Wetlands of International Importance (Ramsar Convention). All receptors that are qualifying features of Designated sites (Natura 2000/Ramsar Sites) or support such features, and which may potentially be affected by the Project, have been considered within this RIAA.

3.1.1.12 The Habitats Regulations define the process for the assessment of the implications of plans or projects on Designated sites. This process is termed the Habitats Regulations Appraisal (HRA) in Scotland.

3.2 The HRA process

3.2.1.1 If a proposed plan or project is not directly related to managing a Designated site, and it cannot be clearly shown that the site's important features will not be affected (no matter where the project is located), the Habitats Regulations require the competent authority to carry out an AA if there is any possibility of a likely significant effect (LSE). The HRA is generally recognized as a four-stage process, aligned with Article 6(3) of the Habitats Directive (see Box 1). It is important to note that Article 6(3) builds upon Articles 6(1) and 6(2), with Article 6(2) placing duties on the competent authority to take steps to support qualifying features before project-level mitigation is considered. Each stage of the HRA process determines whether the next stage is required and defines its scope. Further details on these stages are provided below and in the guidance documents referenced in this section.

3.2.1.2 With respect to Stage 2, the integrity of a Designated site relates to the site's conservation objectives (CO) and has been defined in guidance as "*the coherent sum of the site's ecological structure, function and ecological processes, across its whole area, which enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is designated*" (NatureScot, 2024b). An adverse effect on integrity, therefore, is likely to be one that prevents the site from making the same contribution to favourable conservation status (FCS) for the relevant qualifying feature as it did at the time of designation.

Box 1 Stages of Habitats Regulations Appraisal

Stage 1 – HRA Screening:

This stage identifies the likely impacts of a project or plan upon a Designated site, either alone or 'in combination' with other projects or plans and considers whether these impacts are likely to be significant. It is important to emphasise that the responsibility for providing evidence lies in demonstrating, based on objective information, that there will be no LSE. If the impact of a project or plan may cause LSE, or the outcome is not known, this would trigger the need for AA (NatureScot, 2024a).

Stage 2 – Appropriate Assessment (this Report):

The Habitats Regulations place an obligation on 'competent authorities' to carry out an Appropriate Assessment of any proposal likely to affect a Designated site before any decision to give consent. This relates to any plan or project that is not directly connected with or necessary to the [conservation] management of a Designated site and which could significantly affect that site (either alone or in combination with other known plans or projects). The competent authority should seek advice from NatureScot and not approve an application that would have an adverse effect on a Designated site, except under very tightly constrained conditions that involve decisions by the Scottish Ministers. The competent authorities in the case of the Project will be Aberdeenshire Council and MD-LOT (on behalf of Scottish Ministers).

Stage 3 and 4 – HRA Derogation

If the competent authority cannot establish, with reasonable scientific certainty, that a plan or project, either individually or in-combination, will not negatively impact site integrity, consent should not be granted unless the project fulfils the following criteria:

- There are no viable alternative solutions that would cause less harm or avoid damage to the site (Stage 3 – Assessment of Alternatives).
- The proposal must be carried out for Imperative Reasons of Overriding Public Interest (IROPI) (Stage 4 – Assessment of IROPI).
- Compensation measures are implemented to ensure that the overall coherence of the network of Designated sites is preserved.

3.2.1.3 The HRA Screening process uses the threshold of LSE to determine whether effects on Designated sites should be the subject of further assessment.

3.2.1.4 In the Waddenzee case (Case C-127/02) the European Court of Justice found that an LSE should be presumed, and an AA carried out, if it cannot be excluded on the basis of objective information that the plan or project will not have significant effects on the conservation objectives of the site concerned, whether alone or in-combination with any other project. The Advocate General's opinion of the Sweetman case (Case C-258/11) further clarifies the position by noting that for a conclusion of an LSE to be made "*there is no need to **establish** such an effect... it is merely necessary to determine that there **may** be such an effect*" (original emphasis).

3.2.1.5 For the reasons highlighted above, the assessment process follows a precautionary principle throughout and the word 'likely' is regarded as a description of a risk (or possibility) rather than an expression of probability in a legal sense. As such, the Designated sites screened in for AA, as described in this report, either have:

- an LSE identified during HRA Screening; or
- an LSE cannot be excluded.

3.2.1.6 On 12 April 2018, the Court of Justice of the European Union issued a judgment on Case C323/17 (People over Wind, Peter Sweetman v Coillte Teoranta) which stated (at paragraph 41):

3.2.1.7 "*Article 6(3) of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora must be interpreted as meaning that, in order to determine whether it is necessary to carry out, subsequently, an appropriate assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects [mitigation] of the plan or project on that site*."

3.2.1.8 This ruling means that mitigation was not considered in HRA Screening but is now included in the RIAA herein, in the determination of whether or not the Project has AEoSI either alone or in combination with other projects.

3.2.1.9 As stated in the HRA Screening Report, *de minimis* effects due to the Project alone that were screened out may be considered in this RIAA where they can contribute to an AEoSI in combination with other projects.

3.3 Relevant technical guidance

3.3.1.1 Technical guidance that has been used during the development of the RIAA includes:

- Scottish Government guidance on marine licensing and consenting: offshore renewable energy projects (Scottish Government, 2025).
- Scottish Government guidance on Marine Licensing and consenting: Habitats Regulations Appraisal (Scottish Government, 2024).
- NatureScot Habitats Regulations Appraisal (HRA) Guidance (NatureScot, 2024a).
- NatureScot Maintain or Restore Objectives – Guidance for Habitats Regulations Appraisals (HRA) (NatureScot, 2024b).
- Study detailing migratory bird populations and their migratory routes, population sizes, and behaviour. The document provides a strategic review of Collision Risk Modelling (CRM) input parameters, including their flight patterns, heights, and avoidance behaviour in response to structures like wind turbines (Woodward *et al.* 2023).
- NatureScot Guidance Note 1: Guidance to support Offshore Wind Applications: Marine Ornithology – Overview (NatureScot, 2025a).
- NatureScot Guidance Note 2: Guidance to support Offshore Wind Applications: Advice for Marine Ornithology Baseline Characterisation Surveys and Reporting (NatureScot, 2023a).

- NatureScot Guidance Note 3: Guidance to support Offshore Wind Applications: Identifying theoretical connectivity with Special Protection Areas using breeding season foraging ranges (NatureScot, 2023b).
- NatureScot Guidance Note 4: Guidance to support Offshore Wind Applications: Determining Connectivity of Marine Birds with Marine Special Protection Areas and Key Considerations for Assessment (NatureScot, 2023c).
- NatureScot Guidance Note 5: Guidance to support Offshore Wind Applications: Recommendations for Marine Bird Population Estimates (NatureScot, 2023d).
- NatureScot Guidance Note 6: Guidance to support Offshore Wind Applications: Marine Ornithology Impact Pathways for Offshore Wind Development (NatureScot, 2023e).
- NatureScot Guidance Note 7: Guidance to support Offshore Wind Applications: Marine Ornithology - Advice for assessing collision risk of marine birds (NatureScot, 2025b).
- NatureScot Guidance Note 8: Guidance to support Offshore Wind Applications: Marine Ornithology Advice for assessing the distributional response, displacement and barrier effects of Marine birds (NatureScot, 2023f).
- NatureScot Guidance Note 11: Guidance to support Offshore Wind Applications: Recommendations for Seabird Population Viability Analysis (PVA) (NatureScot, 2023g).
- NatureScot European Site Casework Guidance: How to consider plans and projects affecting Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) (NatureScot, 2022).
- Joint Statutory Nature Conservation Bodies (SNCBs) Interim Displacement Advice Note (SNCBs, 2022).
- EU Guidance on wind energy development in accordance with EU nature directives (European Commission, 2020).
- Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (JNCC, 2020).
- Guidance for assessing the significance of noise disturbance against Conservation Objectives of harbour porpoise SACs (JNCC, 2020).
- The protection of Marine European Protected Species from injury and disturbance: Guidance for Inshore Waters (July 2020 Version) (Marine Scotland 2020).
- NatureScot Guidance Note 9: Guidance to support Offshore Wind Applications: Marine Ornithology Advice for Seasonal Definitions for birds in the Scottish Marine Environment (NatureScot, 2020a).
- NatureScot Guidance Note - The handling of mitigation in Habitats Regulations Appraisal – the People Over Wind Court of Justice of the European Union judgement (NatureScot, 2020b).
- Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects (Southall *et al.* 2019).
- HRA on the Moray Firth: A Guide for developers and regulators (Scottish Nature Heritage (SNH), 2018a).
- HRA on the Firth of Forth: A Guide for developers and regulators (SNH, 2018b).
- SNH guidance on the Scottish Marine Wildlife Watching Code (SNH, 2017).

- JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys (seismic survey guidelines) (JNCC 2017).
- Guidelines on the Assessment of Transboundary Impacts of Energy Developments on Natura 2000 Sites outside the UK (DECC, 2015).
- SNH HRA guidance document 'HRA of Plans. Guidance for Plan-making Bodies in Scotland' (David Tyldesley and Associates, 2015).
- JNCC guidelines for minimising the risk of injury to marine mammals from piling noise (JNCC, 2010a).
- 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 (European Commission, 2001).

3.4 Appropriate Assessment methodology

3.4.1.1 This report follows the procedures for AA described by the European Commission in the guidance document 'Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC'. These steps are:

- Step 1: Information required. This includes information about the Project, including the project description, information about the baseline environment, such as through the desk studies, surveys and modelling carried out for this Project, and information about the Designated sites affected.
- Step 2: Impact prediction. This step relies on direct measurement such as loss of habitat, along with modelled predicted impacts such as noise.
- Step 3: Conservation objectives. It will be necessary to determine, with reference to a qualifying feature of a Designated site's conservation objectives, whether the impact is likely to result in an adverse effect on site integrity (AEoSI).
- Step 4: Mitigation measures. These must be assessed against the adverse effects that the Project is likely to cause. An explanation of how the mitigation will address the predicted effects should be provided along with evidence of how they will be secured.

3.4.1.2 In this RIAA, mitigation actions are presented in **Chapter 5**. They are then referenced in the discussion of Adverse Effects on Site Integrity in **Chapter 6** and **7** where relevant.

3.4.1.3 The precautionary principle applies to the prediction of impacts, the evidence for the mitigation and the assessment of AEoSI. Where mitigation methods are not 'tried and tested' or there is any other means for uncertainty as to their efficacy, then AEoSI must be concluded. The emphasis is on securing mitigation to avoid AEoSI before any impact is incurred. Where this cannot be achieved then compensatory measures within the derogation process under Steps 3 and 4 of HRA (as outlined in **Section 3.2**, see also **Box 1**), must be considered.

3.5 Summary of Screening

3.5.1.1 Regarding Designated sites for Annex I habitats, the assessment of LSE in Section 7.3.1 of the HRA Screening Report considered one SAC and one Ramsar site for which LSE was ruled out; therefore, both sites were screened out from further consideration in the AA.

3.5.1.2 Among the Designated sites considered in the HRA Screening for marine mammals, one SAC has been screened in for further assessment.

3.5.1.3 For SPAs and Ramsar sites, in total, 33 sites have been identified for offshore ornithology for consideration in AA; two sites have been identified to be taken forward for intertidal ornithology consideration; and four sites have been identified to be taken forward for onshore ornithology consideration.

3.5.1.4 **Appendix A** sets out the LSEs identified, and the full suite of sites screened in and out for further assessment is shown in **Appendix A**, as discussed in the HRA Screening Report.

3.5.1.5 The criteria used to identify Designated sites are as follows:

- **Criterion 1**: Designated site(s) boundary has direct overlap with the Project area;
- **Criterion 2**: Designated site(s) for qualifying mobile species / features (in marine / freshwater / terrestrial environments) whose range (e.g. foraging, breeding, non-breeding, migratory or natural habitat range) may interact with the Project; and
- **Criterion 3**: Designated site(s) and/or qualifying interest features with supporting or functionally linked habitat located within a potential receptor Zone of Influence (ZOI) of the Project area.

3.6 Screening responses from stakeholders

3.6.1.1 The Screening responses received from Stakeholders, and an outline of how these responses are addressed, is presented in **Table 3.1** below.

3.6.1.2 Further engagement on approach and methods can be found in Table 11.1 of **Volume 1, Chapter 11: Marine Mammals**, Table 12.1 of **Volume 1, Chapter 12: Offshore and Intertidal Ornithology**, and Table 23.1 of **Volume 1, Chapter 23: Terrestrial Ecology and Ornithology** of the **EIA Report**.

Table 3.1 Stakeholder issues responses on HRA Screening Report

Stakeholder	**Stakeholder issue ID**	**Date, document, forum**	**Aspect**	**Stakeholder comment**	**How is this addressed in the RIAA**
NatureScot	483	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses and Advice (MD-LOT, 2023).	Marine mammals	*"With regard to seal count data presented in Table 5.6.9, we note that these are August counts for both harbour and grey seals. We advise that numbers of grey seals will be far higher within the SACs during the breeding season, which is the rationale for designation of grey seal SACs. At other times of year, numbers are much lower. It would be useful to present both the August counts and the pup production numbers for grey seals within the SACs, as this would give a much more accurate picture. The EIA and HRA will need to consider the breeding numbers, but we note that all the SACs mentioned will be outside the 20km (grey seal) and 50km (harbour seal) connectivity distances, so an assessment for HRA is unlikely to be needed."*	Seal count data have been presented within **Volume 1, Chapter 11: Marine Mammals** of the **EIA Report**. However, in accordance with NatureScot advice, no SACs for seals have been screened into the RIAA due to the Project being outwith the connectivity distances. Therefore, this information is not presented in the RIAA.
NatureScot	484	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses and Advice (MD-LOT, 2023).	Marine mammals	*"Section 5.6.29 states that SCANS-III density maps will be used to calculate site-specific densities. We support this approach for most species, but for bottlenose dolphin in the inshore cable route, the recently published "East coast of Scotland bottlenose dolphins: estimate of population size 2015-2019"25 should be used.* *25 https://www.nature.scot/doc/east-coast-scotland-bottlenose-dolphins-estimate-population-size-2015-2019"*	Since this advice was given, further updates have been published on the estimate of bottlenose dolphin (*Tursiops truncatus*) population size on the East coast of Scotland (Cheney *et al.*, 2024), which has been incorporated in the baseline and utilised in this RIAA in the assessment of the Moray Firth SAC.

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
NatureScot	489	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses and Advice (MD-LOT, 2023).	Marine mammals	*"The approach to cumulative impacts assessment for marine mammal interests for HRA, EIA and EPS licensing requirements will also require agreement in advance of submission of the application."*	The approach to cumulative impacts assessment for marine mammals follows the standard method using population modelling, integrating piling schedules across projects.
NatureScot	14	9 August 2022 Response to meeting.	Onshore ecology and ornithology	*"European sites including Loch of Strathbeg SPA / Ramsar and their qualifying interest features will require consideration as part of the EcIA and Habitats Regulations Appraisal (HRA) Screening assessments.* *Background and rationale behind the survey work in the EIA Scoping Report should be provided, particularly if there is any deviation from published guidance."*	Consideration of National Site Network (formerly referred to as European sites) within a potential ZOI is presented in within presented in **Volume 3, Appendix 23.8: : Screening Rationale for Assessment of Important Ecological and Ornithological Features**, **Volume 1, Chapter: 23: Terrestrial Ecology and Ornithology** of the **EIA Report** and separately in the HRA Screening Report (MarramWind Limited, 2024)
NatureScot	212	29 September 2022 Meeting.	Onshore ecology and ornithology	NatureScot remarked that there may be some concern over the landfall envelope being too narrow and said that it would potentially be difficult to avoid the SPA due to geological and natural constraints.	The landfall(s) location south of Peterhead, which is referred to at the NatureScot meeting in

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
					2022 was designed out of the Project, favouring landfall options at Scotstown and Lunderton, avoiding proximity to the Buchan Ness to Collieston Coast SPA.
NatureScot	122, 123a, 123b.	22 March 2023 Aberdeenshire Council's Scoping Opinion (Aberdeenshire Council, 2023).	Onshore ecology and ornithology	*"Protected areas* • *Buchan Ness to Collieston Coast SPA – breeding seabirds* • *Bullers of Buchan Coast Site of Special Scientific Interest (SSSI) – coastal geomorphology, maritime cliff vegetation and breeding seabirds.* *These sites lie to the south of Peterhead with the SPA extending into Sandford Bay. There are inconsistencies in the scoping report regarding the assessment of impacts to breeding seabirds which are interests of these protected areas and it is not clear how they will be addressed within the EIA Report. Chapter 6.5 (Terrestrial Ecology and Ornithology) scopes out impacts to qualifying interests of these sites as the features are considered within the assessment of offshore and intertidal ornithology. Chapter 5.7 (Offshore and Intertidal Ornithology) scopes in construction impacts for the landfall and offshore connection cables with relation to intertidal and nearshore ornithological receptors. However, this does not include the breeding colonies as this Chapter only covers land between mean high water and mean low water springs, or seawards. The cliffs used by breeding seabirds are above this tidal limit and so not included within the intertidal zone."* *As there is the potential for significant disturbance to seabirds if construction works take place close to the cliffs / colonies during*	Potential impacts to breeding seabirds (including the breeding colonies), which are interests of Buchan Ness to Collieston Coast SPA and Bullers of Buchan Coast SSSI are considered within **Volume 3, Appendix 23.8** of the **EIA Report**, and separately within the HRA Screening Report (MarramWind Limited, 2024).

Stakeholder	**Stakeholder issue ID**	**Date, document, forum**	**Aspect**	**Stakeholder comment**	**How is this addressed in the RIAA**
				the breeding season we advise that the effects of increased human presence, noise and vibration and increased light levels are scoped in for the qualifying features of the Buchan Ness to Collieston SPA and the Bullers of Buchan SSSI.	
Aberdeenshire Council	71	22 March 2023 Aberdeenshire Council's Scoping Opinion (Aberdeenshire Council, 2023).	Onshore ecology and ornithology	*NatureScot comments on the protected areas and protected species noted within the scoping report. In terms of protected areas, inconsistencies are noted regarding assessment of impacts of breeding seabirds (that are interests of the Buchan Ness to Collieston Coast SPA Bullers of Buchan Coast SSSI) and how they are to be addressed in the EIA Report. Chapter 6.5 (Terrestrial Ecology and Ornithology) scopes out impact to qualifying interests, however Chapter 5.7 (Offshore and Intertidal Ornithology) scopes in construction impacts for the landfall. The cliffs used by breeding seabirds are not considered to be within the intertidal zone and should be considered a terrestrial feature. It is advised that effects of human presence, noise and vibration and increased light levels be scoped in for the qualifying features of the above-named SPA and SSSI.*	Potential impacts to breeding seabirds (including the breeding colonies), which are interests of Buchan Ness to Collieston Coast SPA and Bullers of Buchan Coast Site of Special Scientific Interest (SSSI) are considered within **Volume 3, Appendix 23.8** of the **EIA Report**, and separately within the HRA Screening Report (MarramWind Limited, 2024).
Aberdeenshire Council	796, 797, 798, 799.	16 September 2024, HRA Screening Response (Aberdeenshire Council, 2024).	Onshore ecology and ornithology	*"HRA Screening Request* *The submitted document is comprehensive and has considered whether the project is likely to have a potential LSE on the qualifying interest of an extensive list of SPAs, SACs and Ramsar Sites. It is agreed that further assessment is required, as set out in the screening document, to inform an appropriate assessment of effects, to accompany the planning application.* *Environment and Infrastructure Services – Natural heritage consider that the submitted HRA screening document is comprehensive and has considered whether the project is likely to have a potential LSE on the qualifying interests*	HRA Screening Report (MarramWind Limited, 2024) presents the screening of LSEs and the RIAA takes LSEs (Pink-footed goose (*Anser brachyrhynchus*)) through for further assessment.

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
				As a result of the screening it is concluded that there is potential for LSE from the project on two sites in relation to intertidal ornithology and four sites in relation to onshore ornithology. It is proposed that these will be taken forward for further assessment and a report will be prepared to inform an appropriate assessment of the effects with the planning application. The conclusions appear to be acceptable however as these are sites of international importance then the views of Nature Scot should also be sought. *NatureScot has commented that two sites have been taken forward for intertidal ornithological consideration and four sites have been taken forward for onshore ornithological consideration. We agree with the conclusions of the HRA screening report as summarised in table 8.1. Our advice is in relation solely to the onshore elements.”* *To summarise, further assessment is proposed and agreed by the Planning Service as set out in the submitted document ‘Habitats Regulations Appraisal Screening Report MarramWind Offshore Wind Farm’ (Doc. No. MAR-GEN-PMG-REP-WSP-000022, dated August 2024) as submitted with this screening request.*	
MD-LOT	806	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*“MD-LOT is broadly content with the conclusions of the HRA screening report. However, in line with the NatureScot representation, further information is required on what tracking data is being referenced in the HRA screening report to provide more detailed advice for kittiwake at St Abbs to Fast Castle Special Protected Area (“SPA”), and gannet at Sule Skerry and Sule Stack SPA.”*	The Project has provided responses to the comments raised by NatureScot for stakeholder ID 832 and 969.

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
MD-LOT	807	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*"MD-LOT highlights the NatureScot and Natural England representations, which do not support the screening out of the following designated sites; gannet at North Rona and Sula Sgeir SPA, great skua at St Kilda SPA, and guillemot at Flamborough and Filey Coast SPA. MD-LOT also advises that Manx shearwater is included within the report to inform the appropriate assessment."*	The Project has provided responses to the comments raised by NatureScot and Natural England for stakeholder ID 969, 834, 819 and 970.
MD-LOT	808	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*"MD-LOT refers to the representations made by NatureScot and RSPB Scotland which must be considered in full within the HRA. Specifically, NatureScot's recommendation of using Woodward et al. (2019) foraging ranges for kittiwake, and the advice on the assessment of distributional responses of fulmar."*	The Project has further discussed consideration of fulmar (*Fulmarus glacialis*) distribution responses and kittiwake (*Rissa tridactyla*) foraging ranges with key stakeholders as noted in stakeholder ID 832 and 970.
MD-LOT	809	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*"MD-LOT is content with the approach taken for screening seabirds in the non-breeding and migratory seasons and for screening migratory seabirds. MD-LOT notes potential changes to the approach taken for migratory non-seabirds and that further engagement with relevant stakeholders is anticipated."*	The Project has further discussed consideration of migratory birds with key stakeholders as noted in stakeholder ID 840.
MD-LOT	810	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*"MD-LOT advises that the inconsistencies highlighted in the NatureScot representation concerning Table 4.6, Table 8.1, and tables in Appendix C of the HRA screening report must be fully addressed and taken forward within the HRA."*	The Project has provided a response to the comment raised by NatureScot for stakeholder ID 843.

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
MD-LOT	811	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*"MD-LOT advises that the representation by NatureScot and RSPB Scotland must be fully considered and implemented within the HRA. Specifically, including vessel disturbance if applicable and the consideration of lighting on ornithological receptors as a potential impact pathway for species such as European storm petrel, Leach's storm petrel, and Manx shearwater in the HRA."*	The Project has further discussed consideration of vessel disturbance and potential effects on petrels and Manx shearwaters with key stakeholders as noted in stakeholder ID 970.
MD-LOT	812	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*"MD-LOT broadly agrees with the approach to the in-combination assessment outlined within Section 7 of the HRA screening report. However, MD-LOT in line with the NatureScot representation, seeks clarification on what is meant by "projects that will be screened out for in-combination assessment consideration may include UK offshore wind farms evaluated as having low data confidence on the basis that no construction or operational period is known" noted in Section 7.4.4.3. MD-LOT requests MarramWind Ltd identify which projects this statement refers to."*	This statement refers to either developments in the early stages of the consent process (i.e., pre-application) or older consented operational offshore wind farms where there is limited to no available information relating to quantified impact predictions from the development to inform an in-combination effect.
NatureScot	832	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	***"Kittiwake - St Abbs Head to Fast Castle*** *We acknowledge that tracking studies have been undertaken for kittiwake at St Abbs Head to Fast Castle SPA but need further detail as to what studies are being referred to here. In particular, information on the time period and sample size enables us to understand how representative these data are. At this stage, we do not consider there is sufficient evidence to change our advice regarding the use of Woodward et al. (2019) foraging ranges. This is for the following reasons:* *• Kittiwake foraging ranges can be highly variable (O'Hanlon et al. 2014; Robertson et al.2014). There is evidence for variability between individuals at a site, at different times during seasons,*	On a precautionary basis, the Project has included the kittiwake feature of St Abbs Head to Fast Castle SPA within assessments during both the breeding and non-breeding season despite tracking data suggesting no connectivity.

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
				and across years. Some birds show a dual foraging strategy making occasional long distance oceanic trips and regular shorter trips. Foraging ranges can also vary with environmental conditions and prey availability, with potentially shorter foraging ranges in years with more abundant prey. HPAI may also be affecting foraging ranges. *• This variability means that caution should be applied when using site specific foraging ranges for kittiwake, particularly if these are based on a small sample size or on data from a small number of years.* *• Some species such as gannet (Wakefield et al. 2013) are showing some segregation in their foraging ranges between sites, but kittiwake are demonstrating mixed results with both overlap and segregation effects.* *In view of the above we currently continue to advise using Woodward et al. (2019) foraging ranges for kittiwake. Tracking studies already undertaken are providing the basis for potentially adjusting foraging ranges, but we consider that because of the variability shown by kittiwake, further work is still required."*	
NatureScot	833	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	***"Gannet*** *On principle we cannot accept the screening out of Sule Skerry and Sule Stack SPA based on tracking data without fully understanding what tracking data are being referred to. However, we do accept no connectivity for Ailsa Craig SPA due to consideration of the at-sea distance.* *Based on tracking data presented in Wakefield et al. (2013), we can accept Flamborough and Filey Coast SPA, St Kilda SPA, and Seas off St Kilda SPA are screened out. However, as North Rona and Sula Sgeir SPA was not included in the study, we do not support the conclusion of no LSE for this site in the breeding season."*	Please refer to stakeholder ID 969.

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
NatureScot	834	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	***"Great Skua*** *We do not accept no connectivity for St Kilda SPA based on significant land barriers, as connectivity is assessed by at-sea distance for the HRA screening process. The proposed development array area is within at-sea foraging range for great skua at St Kilda SPA."*	As requested, potential effects on the great skua (*Stercorarius skua*) feature of St Kilda is considered within **Section 6.2.19**.
NatureScot	835	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	***"Manx Shearwater*** *The applicant notes an intention to screen out Manx shearwater from LSE due to low numbers recorded in their DAS. We note this species can fly outside daylight hours, which leads to detection issues in DAS (Deakin et al. 2022), as surveys are conducted during the day. Therefore, we advise that this species is included within the RIAA. Given the challenges of undertaking a quantitative assessment for procellariforms based on the limitations of the survey technique for detecting and estimating populations for these species, we advise that a qualitative assessment can be undertaken."*	Please refer to stakeholder ID 970.
NatureScot	836	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	***"Guillemot*** *Paragraph 4.1.4.17 discusses guillemot in the non-breeding season, and states "the Applicant would welcome further discussion on potential connectivity with more distant sites based on Buckingham et al. (2022) data". We welcome the approach suggested by the applicant and would be willing to discuss and finalise the details around this approach."*	Please refer to stakeholder ID 864.
NatureScot	837	05 November 2024, HRA Screening Responses	Offshore and intertidal ornithology	***"Fulmar*** *Fulmar have not previously been assessed in projects due to being a lower risk for both collision and displacement. However, they have now started to be included in some assessments, particularly due to proximity to breeding colonies and concerns with barrier effects.*	Please refer to stakeholder ID 970.

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
		(MD-LOT, 2024).		*We recommend revisiting the assessment of distributional responses for fulmar and consider whether this information is relevant for the proposed development. As fulmar generally have not previously been assessed in other applications, it may not be possible to undertake a cumulative assessment for this species, but we welcome the addition to the screening process. We note that potential LSE has been concluded for Buchan Ness to Collison Coast SPA for direct habitat loss during construction and decommissioning stages."*	
NatureScot	838	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	***"Herring gull*** *Potential for LSE has been concluded despite the development being outside of MM+1SD foraging rage for this species due to high numbers seen. We welcome this approach."*	Please refer to stakeholder ID 864.
NatureScot	839	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	***"Seabirds in the non-breeding and migratory seasons*** *The screening of sites and species within connectivity during the non-breeding season and migratory seasons has been undertaken using the BDMPS. We agree with this approach and the exception used for guillemot during the non-breeding season."*	The Project welcomes the agreement.
NatureScot	840	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	***"Migratory non-seabirds*** *The screening of migratory non-seabirds is appropriate. However, we note that there may be changes to this approach, as stated in communication between MD-LOT and the applicant. Therefore, it would be helpful to understand when this information will be provided. In undertaking the assessment for migratory waterbirds, the recently published Offshore wind strategic review (2023) should be used."*	The Project has undertaken migratory collision risk modelling (mCRM) as presented within **Volume 3, Appendix 12.6: Offshore Ornithology Migratory Collision Risk Modelling**

Stakeholder	**Stakeholder issue ID**	**Date, document, forum**	**Aspect**	**Stakeholder comment**	**How is this addressed in the RIAA**
					utilising the data within the offshore wind strategic review (Woodward *et al.* 2023).
NatureScot	842	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*"For seabird assemblage features, please note that any named component species of a seabird assemblage are protected in their own right. In Scotland, the current practice is that the existence of the assemblage is acknowledged as a qualifying feature on the citation but it has no relevant conservation objectives. Rather, the protection and ecological needs of the assemblage are catered for entirely via the application of the conservation objectives for the named component species. An HRA assessment should therefore be carried out for each named assemblage feature, with the overall assemblage conclusions drawn from these individual assessments."*	An assessment of each designated sites assemblage feature qualifying feature is provided within **Section 6.2.25**.
NatureScot	842	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*"Guillemots at Calf of Eday SPA (150.25km) are only considered in the non-breeding season. However, Northern Isles guillemots have a foraging range of 153.7km (Guidance Note 3)."*	The Project has checked the conclusions drawn and distance measurement from the Project. The Project can confirm the guillemot (*Uria aalge*) feature of Calf of Eday SPA is within foraging range of the Project and therefore has been screened in for both breeding and non-breeding season assessment.
NatureScot	842	05 November 2024, HRA	Offshore and	*"Foraging range for puffin is 265.4km so Hermaness, Saxa Vord and Valla Field SPA (259.03km) is within breeding season foraging range."*	The Project has checked the conclusions drawn and distance measurement

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
		Screening Responses (MD-LOT, 2024).	intertidal ornithology		from the Project (edge to edge at sea distance measured as ~270km). The Project can confirm the puffin (*Fratercula arctica*) feature of Hermaness, Saxa Vord and Valla Field SPA is not within foraging range of the Project and therefore is only screened in and assessed for the non-breeding season.
NatureScot	843	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*"We note that there are differences in LSE conclusions between seasons in Tables 4.6, 8.1 and tables in Appendix C. It would be useful to have these differences clarified, with further narrative presented. These included, but were not limited to:*	Please see Stakeholder ID 842 in relation to the guillemot feature of Calf of Eday SPA. The project can confirm that for the kittiwake feature of Handa SPA, the correct conclusion is no potential for LSE concluded based on the justification provided.

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<tr><th>Stakeholder</th><th>Stakeholder issue ID</th><th>Date, document, forum</th><th>Aspect</th><th>Stakeholder comment</th><th>How is this addressed in the RIAA</th></tr>
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<table>
<tr><th>SPA</th><th>Distance</th><th>Species</th><th>Table 4.6</th><th>Table 8.1</th><th>Appendix C</th></tr>
<tr><td>Calf of Eday</td><td>150.25km</td><td>Guillemot</td><td>Criterion 2 (non-breeding season only).</td><td>Not mentioned.</td><td>LSE in breeding season for distributional response and entanglement.</td></tr>
<tr><td>Handa</td><td>260.64km</td><td>Kittiwake</td><td>Criterion 2 (breeding season only).</td><td>Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.</td><td>Species recorded within site-specific surveys within the Project OAA and known to fly at potential collision height (PCH; Johnston et al. 2014). Potential for an effect only during the non-breeding season due to the Project OAA being outwith of the species mean max plus one SD foraging range (Woodward et al. 2019). During the non-breeding season only 1% of the SPA population is considered to remain within the North Sea for the entire non-breeding season (Furness 2015). Therefore, any effect is likely to be immaterial, especially considering the wider mixing of populations within the non-breeding season. Therefore, no potential for LSE concluded.

In the table it appears potential for LSE has been concluded.</td></tr>
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”</td><td></td></tr>
<tr><td>NatureScot</td><td>844</td><td>05 November 2024, HRA Screening Responses (MD-LOT, 2024).</td><td>Offshore and intertidal ornithology</td><td>“We note that connectivity has been identified for procellariforms including European storm petrel at Auskerry SPA. The potential effects of lighting on ornithological receptors should be considered as an impact pathway. Species such as European storm petrel, Leach’s storm-petrel and Manx shearwater may be attracted to and/or disorientated by artificial light sources. Potential for LSE should be re-considered for these species in relation to this impact pathway for construction and decommissioning, as well as for operation and maintenance. As well as impacts from turbine lighting, there could be impacts from lighting on servicing or construction vessels, especially if construction will be a 24/7 operation. We recommend considering the findings from the Marine Directorate commissioned review to inform the</td><td>Please refer to stakeholder ID 970.</td></tr>
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Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
				assessment of the risk of collision and displacement in petrels and shearwaters from offshore wind developments in Scotland (Deakin et al. 2022).”	
NatureScot	844	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*“Distributional responses – for this proposed development a 2km buffer should be sufficient for the species being assessed. A 4km buffer is required for sea ducks but we note that none were recorded in the two years of DAS. No divers were recorded which would require a larger buffer.”*	The Project welcomes this confirmation.
NatureScot	844	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*“We note wet storage has not been considered in this screening. It is unclear whether this should form part of the EIA Report and RIAA for this application or should be considered as an aspect related to the relevant port and harbour expansion considerations. We are aware that Marine Directorate are currently considering consenting routes and processes around the activities associated with both the construction and maintenance phases and requirements to assemble, maintain and store components away from the array area. We would welcome further discussion on this as and when further details are available, to help inform our advice going forward.”*	The use of Wet Storage is likely to be required for the storage of floating units (pre and post turbine integration) for the Project. This is considered to be outside the scope of this EIA and the Marine Licence applications for the offshore infrastructure. The port facilities to be used for the Project are still unconfirmed at this stage, although possible ports that may be suitable are referred to in **Chapter 2**. The intent is that the Project will utilise port facilities, which will have appropriate consents for wet storage of floating

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
					units, fabrication and assembly with the WTGs. Separate marine licences and associated impact assessments for wet storage areas outwith the Offshore Red Line Boundary will be applied for, consulted on and undertaken as appropriate.
NatureScot	845	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	***"In-combination assessment*** *In Section 7.4.4.3 'Ornithological features', we seek clarification on what is meant by "projects that will be screened out for in-combination assessment consideration may include UK offshore wind farms evaluated as having low data confidence on the basis that no construction or operational period is known", including identifying which projects this refers to.*	Please refer to stakeholder ID 812.
Royal Society for the Protection of Birds (RSPB)	847	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*The UK is of outstanding international importance for its breeding seabirds and wintering marine birds. As with all Annex I and regularly migratory species, the UK has a particular responsibility under the Birds Directive to secure their conservation. Their survival and productivity rates can be impacted by offshore windfarms directly (i.e. collision) and indirectly (e.g. displacement from foraging areas, additional energy expenditure, potential impacts on forage fish and wider ecosystem impacts such as changes in stratification).* *RSPB Scotland encourage the adoption of a precautionary approach to the identification of relevant protected sites for seabirds with clear methodology on the exclusion of sites and species.We generally agree with the collection and analysis*	This is noted, for clarity where the Project considers it appropriate to deviate from NatureScot's recommended guidance documentation, the approach has been clearly labelled as the 'Developer Approach'

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
				methods advised by NatureScot, with some exceptions as set out below. We recommend use of the guidance notes available on their website to inform assessment. If an Applicant chooses to undertake supplementary modelling using alternative parameters to that recommended, we suggest this is clearly labelled. *As set out in Searle et al (2023), assessing impacts of offshore windfarms and other renewables developments is inherently uncertain. This uncertainty is propagated throughout the impact assessments, as there are not only direct impacts, but ecosystem wide impacts that can change, for example, the abundance and availability of prey. Multiple data sources and modelling techniques are used to capture a simplified version of reality. They do not fully capture the complexity of seabird behavioural or demographic processes in a dynamic marine environment.* *Not recognising these uncertainties risks poorly informed decisions being made. Furthermore, an underestimation of impacts will have repercussions when consenting later offshore wind development. If a precautionary approach is taken from the beginning, the likelihood of irreversible damage occurring is reduced even whilst our knowledge base is incomplete, and modelling improves.* *The precautionary principle requires the Applicant to demonstrate with scientific certainty that something would not be harmful. The concept of something being overly precautionary dismisses the inherent uncertainty in modelling and overlooks the simplistic version of reality that the modelling captures."*	
RSPB	848	05 November 2024, HRA	Offshore and	*"If the number and size of the turbines to be installed remains uncertain when the application for the development is submitted, RSPB Scotland assumes that any assessment submitted in*	The Project can confirm that the worst-case scenario has been

Stakeholder	**Stakeholder issue ID**	**Date, document, forum**	**Aspect**	**Stakeholder comment**	**How is this addressed in the RIAA**
		Screening Responses (MD-LOT, 2024).	intertidal ornithology	*support of the application will reference the 'worst case scenario' when it comes to identifying LSE."*	considered both when identifying LSE and subsequently assessing any potential effects identified.
RSPB	849	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*"RSPB Scotland would welcome further engagement with the Applicant in response to para. 4.1.4.17 and, when appropriate, 4.1.4.19."*	In relation to guillemot (para. 4.1.4.17) and migratory features (para. 4.1.4.19) proposed assessment approach please refer to stakeholder ID 819 and 840.
RSPB	850	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*"Noting the potential impacts identified in Table 6.1, and the species recorded and referenced in Table 5.5, in particular European and Leach's Storm Petrel and Manx Shearwater, RSPB Scotland disagree with the screening out of these species in Table 8.1. These species can be subject to attraction to light and subsequent disorientation, as highlighted in a recent review commissioned by the Marine Directorate (Deakin et al. 2022) Such attraction, and subsequent disorientation, could have both direct and indirect impacts on these species. Direct impacts would be collision of birds that have altered their flight trajectory to enter the rotor swept zone, and it is most likely best considered by amended collision risk models. Indirect impacts could be through the energetic consequences of additional flight, which could result in subsequent mortality or reduced breeding performance. RSPB Scotland would welcome discussion with the Applicant as to a suitable impact pathway and methodology for this assessment."*	Please refer to stakeholder ID 970.
RSPB	851	05 November 2024, HRA	Offshore and	*"Again, noting the potential impacts identified in Table 6.1, and the reference to Fulmar in Table 5.5, it is not clear why no LSE have been identified for Fulmar in Table 8.1. RSPB Scotland would*	Please refer to stakeholder ID 970.

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
		Screening Responses (MD-LOT, 2024).	intertidal ornithology	*welcome the inclusion in Table 8.1 of distributional responses as an impact for Fulmar, in particular in the consideration of in-combination impacts. We acknowledge that this is not something that has usually been considered for this species, mainly due to their large foraging range. However, the scale of proposed development in the ScotWind leasing round may mean that this becomes an emerging issue, and RSPB Scotland would welcome its consideration."*	
RSPB	852	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	*"RSPB Scotland would also welcome inclusion in Table 6.1 of consideration of the potential wider ecosystem impacts that may arise through the construction and operation of the wind farm. These could occur, for example, through changes in water column stratification arising from the presence of the wind farm ultimately altering the availability of prey to seabirds."*	**Volume 1, Chapter 32: Inter-Related Effects** provides an ecosystem assessment.
Natural England	819	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	***"Flamborough and Filey Coast SPA - Common Guillemot*** *Natural England advise that common guillemot from the Flamborough and Filey Coast SPA should be screened in for potential impacts during the non-breeding season. Whilst Furness (2015) indicates that non-breeding individuals are likely to stay relatively close to their breeding colony in the non-breeding season, there is limited empirical evidence currently exists to support this, to quantify the extent over which this operates, and whether it applies to the same extent for all colonies. Natural England requests that to assess the potential impacts on Flamborough and Filey Coast SPA guillemot in the non-breeding season, the traditional approach of apportioning birds to the relevant SPA using the BDMPS populations as prescribed by Furness (2015).* *We recognise that this advice differs from that provided by NatureScot / Marine Scotland, who advise that the breeding*	Please see **Section 6.2.27** for assessment of the guillemot feature of the Flamborough and Filey Coast SPA as requested.

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
				season mean / max, +1SD foraging ranges should also be used in the nonbreeding season for this species, which we do not wish to contradict. However, we consider a specific exception to this advice should be made when considering impacts on Flamborough and Filey Coast SPA, due to the potential for the Marram to contribute to the in-combination impacts that multiple North Sea developments are already exerting on this SPA feature. We note that other Scottish projects already appear in the English in-combination assessments for this species, so this exception would facilitate the inclusion of Marram in future assessments. *If the applicant and Marine Scotland agree that the applicant should follow the NatureScot advice, it would nevertheless be useful if Marram's Environmental Statement could include the impact values for non-breeding Guillemot from FFC SPA based on the BDMPS apportioning approach. Alternatively, you could provide this separately to Natural England. This would avoid the need for offshore wind farm developers in the English North Sea and / or Natural England to carry out separate apportioning work for inclusion in relevant in-combination assessments."*	
Natural England	820	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	***"Stable Age Apportioning*** *Natural England advise that, where possible, site-specific ageing data (e.g. from Digital Aerial Surveys (DAS)) be used to age-apportion birds. Where this data is not available, Natural England advise that all 'adult-type' birds are apportioned as adults. Natural England does not support the use of the stable age structure approach for age apportioning, due to:* *a) uncertainty regarding survival rates – in particular for immature age classes,* *b) lack of information about non-breeding adult components of populations, and*	The Project notes Natural England's opinion with regard to stable age apportioning. The Project has discussed further the most appropriate method for defining age ratios within the apportionment process with NatureScot and have followed their advice provided to the Project (see stakeholder ID 868).

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
				c) the underlying assumption that populations are stable (which is not the case for many populations)"	Due consideration was given to the age ratios derived from DAS data within **Volume 3, Appendix 12.1: Offshore and Intertidal Ornithology Baseline Report**.
Natural England	821	05 November 2024, HRA Screening Responses (MD-LOT, 2024).	Offshore and intertidal ornithology	***"Sabbatical Rates*** *If there is clear evidence relating to the proportion of adults within the population likely to be taking a sabbatical in any given year, then this can be considered at the population modelling stage. The weight of evidence is on demonstrating:* *a) the proportion of breeding adults in the population likely to be taking a sabbatical in any given year* *b) whether the SPA population estimates include or exclude sabbatical birds, and* *c) whether or not sabbatical birds are likely to use the area of sea around the SPA colony.* *This evidence can be used to inform whether and how sabbaticals are best incorporated in a Population Viability Analysis (PVA).* *In the absence of such evidence, Natural England's standard advice is to assume no sabbaticals, i.e. to assume all adult birds are breeding birds. Natural England advise that we do not agree with the use of sabbatical rates to exclude sabbatical birds from impact assessment, nor do we consider*	The Project notes Natural England's opinion with regard to sabbatical rates. The Project has discussed further the inclusion of sabbatical rates within the apportionment process with NatureScot and have followed their advice provided to the Project (see stakeholder ID 868).

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
				the inclusion of sabbatical rates to be appropriate within the apportioning process."	
NatureScot	862	27 November 2024, Offshore Ornithology Assessment Methodology Clarifications Technical Note.	Offshore and intertidal ornithology	5. For the key species specified in Table 1, please can NatureScot confirm whether the SMP database provides the most up to date colony counts for Scottish colonies? If not, is NatureScot able to provide the Applicant with information on how to obtain the most recent and up-to-date data on Scottish seabird colony counts. 6. The Applicant would welcome feedback from NatureScot regarding its current position on colony census data from Scottish seabird colonies for use in the impact assessment. Are the 2024 census data considered to represent 'normal' counts, or are there instances of colonies being affected (reduced) by HPAI and/or unusual winter conditions? In such instances which colony counts do NatureScot consider most appropriate to use in the impact assessments, in particular for East Caithness cliffs SPA and Forth Islands SPA. **NatureScot Response** "*With regards to the first point, it is our understanding BTO are still finalising uploading some of the 2024 data on to the SMP. For gannets specifically, we undertook a gannet census this year, however, this data is not currently on the SMP but we can provide these counts if these are required before they are uploaded to the SMP.* *For the second point we think it is incorrect to consider the counts as normal or not normal. However, there is a valid point to consider about the temporal nature of the DAS baseline data being more comparable with the pre-HPAI population figures in terms of the context and level of impact for some species. Therefore, we advise to use the Seabirds Count populations but consider the context of the most recent counts as to whether the*	Please see response to stakeholder ID 961.

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
				population is declining rather than the trends provided in Seabirds Count for most species. However, for gannet due to the timing of the DAS surveys, and when gannet were initially impacted by HPAI, the Project should compare this to more recent surveys, such as the census we undertook this year. Alongside the fact that the Seabirds Count gannet data was from 2013."	
NatureScot	864	27 November 2024, Offshore Ornithology Assessment Methodology Clarifications Technical Note.	Offshore and intertidal ornithology	8. The Applicant would welcome feedback from NatureScot in relation to the proposed method for defining the non-breeding season, the subsequent proposed non-breeding populations for all species in Table 4, and NatureScot's recommendation for the inclusion or exclusion of a non-breeding season assessment for Atlantic puffin. **NatureScot Response** "*Using the BDMPS to define non-breeding season population size is appropriate so we agree with the approach outlined by the Project. The approach outlined for guillemot follows our guidance, so we accept this approach as well.* *With regards to herring gull a regional assessment in the non-breeding season is appropriate as mentioned in 5.1.1.3. Similar to guillemot we recommend that the herring gull non-breeding season population is defined using the breeding season foraging range. This is due to the fact that herring gulls do not migrate in the UK, as described in Furness (2015).* *If by using the breeding season foraging range to determine connectivity between the WDA and herring gull SPA colonies in both the breeding and non-breeding seasons results in no SPA connectivity with the WDA, herring gull should be assessed through the EIA only.* *For puffin we are aware of a NEEOG meeting that took place recently where the assessment approach for Puffin in the non-*	In relation to Herring gull (*Larus argentatus*) non-breeding season assessments, the Project OAA is outwith the species foraging range, therefore potential effects arising from the OAA has been assessed within **Volume 1, Chapter 12: Offshore and Intertidal Ornithology** of the **EIA Report** only as advised. In relation to puffin the NEEOG non-breeding season assessment approach recommendation is not yet available and therefore non-breeding season assessments follows the Furness (2015) agreed for other seabird species.

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
				breeding season was discussed. The developers at this meeting suggested a regional approach similar to guillemot could be looked at for puffin. We advised in this meeting that this seemed a sensible approach and an outcome of the meeting was that NEEOG would draft a paper of this proposal and send it to NatureScot for review. If this paper is available, we would be happy to review this and provide comment where necessary."	
NatureScot	868	27 November 2024, Offshore Ornithology Assessment Methodology Clarifications Technical Note.	Offshore and intertidal ornithology	17. The Applicant would welcome agreement from NatureScot in relation to the proposed approach to breeding season HRA apportionment. 18. The Applicant would welcome feedback from NatureScot to confirm if it agrees with the sabbatical rates and age ratios suggested for use within the HRA apportionment process. The approach outlined for breeding season HRA apportionment follows our current guidance of using our 'Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in SPAs' (2018). **NatureScot Response** "*As long as the adult/immature age ratio and sabbatical rates presented align with Furness, 2015 and what was presented in Seagreen 1, we are content with this approach. However, with regards to deriving figures from DAS for Gannet and Kittiwake we would need to see the DAS derived figures before agreeing to this method so would welcome this being provided alongside commentary on the confidence the Project has on these figures.*"	The Project welcomes agreement on the recommended approach. Further detail relating to conclusions on the most appropriate data source to inform adult/immature ratios is provided within **Appendix C**.
NatureScot	869	27 November 2024, Offshore	Offshore and intertidal ornithology	19. The Applicant would welcome agreement from NatureScot in relation to the proposed approach to non-breeding season HRA apportionment and recommendation in relation to Atlantic puffin.	Please see response to Stakeholder ID 864.

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
		Ornithology Assessment Methodology Clarifications Technical Note.		**NatureScot Response** "*Please see above for our response on undertaking a non-breeding assessment of Puffin*."	
NatureScot	960	24 June 2025, HRA Meeting.	Offshore and intertidal ornithology	**a. HRA apportionment process:** The Project requested confirmation on the most appropriate measurement distance to inform the HRA Apportionment process requirements. Three different options were presented; • edge to edge boundary, • centroid-to-centroid; or • an alternative measurement. "*NatureScot responded that in relation to Forth Islands - centroid doesn't work due to number of islands - propose selecting centroid of population i.e. Isle of May - puffin, gannet - bass rock. NS guidance notes that if species is skewed to a section of the SPA then it should be centroid of the skew.* *NatureScot recommended that edge-to-edge measurements should be used for HRA screening, and centroid-to-centroid should be used for apportionment.*"	The project has followed the advice provided by NatureScot when measuring distances between the Project and designated sites for HRA apportionment as detailed within **Appendix C**.
NatureScot	961	24 June 2025, HRA Meeting.	Offshore and intertidal ornithology	**Contemporaneous counts – deriving counts from Seabirds Count and SMP database** The Project requested clarification on the use of Seabird Count data (Burnell *et al.* 2023) or SMP data to inform EIA and HRA reference populations for assessment. **NatureScot post meeting response** "*To ensure that the assessment of predicted impacts at a population level are as robust and accurate as possible, we advise that the counts most contemporaneous with the Digital*	The project has followed the advice provided by NatureScot when deriving counts for HRA apportionment as detailed within **Appendix C**. Additionally, AAs presented within this report have been assessed against Burnell *et al.*

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
				Aerial Survey (DAS) period are used. The DAS capture a snapshot of birds using or passing through the survey area at the time of each survey and across the 24-month survey period. The use of contemporaneous counts means that the birds recorded within the DAS period are attributed to their relevant colonies from the same year, therefore reducing the effects of interannual variation in population numbers (especially as a result of HPAI or other mass mortality events) and avoiding a mismatch of impacted birds vs breeding populations between years. Using population counts from the same or similar time period also improves compatibility and consistency, particularly at the stage of apportioning impacts to breeding populations. *Updated population counts for the majority of breeding colonies and species can be found in the 4th national seabird census, Seabirds Count (Burnell et al. 2023). This is the preferred source of seabird population counts for offshore wind applications, however given that the census did not cover all colonies, we are aware that there may be scenarios where some colonies do not have up to date counts for some species.* *If a population count for a specific colony in the Seabirds Count (Burnell et al. 2023) dataset is not contemporaneous with the DAS survey period for an offshore wind application, we advise that a relevant count should be obtained from the Seabird Monitoring Programme (SMP) database (SMP, 2025), if available. Counts should be derived from the SMP database with caution, with particular care taken to check the counting unit, method, and to ensure all relevant sub-sites within a master site are included in the total population count.*"	(2023) where available, alongside the latest available count to provide context of potential effects pre and post HPAI.
NatureScot	965	24 June 2025, HRA Meeting.	Offshore and	**e. HPAI considerations:** The Project asked for an update regarding guidance in handling HPAI.	For key qualifying features a summary of the population trend and any

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
			intertidal ornithology	"*NatureScot responded that there is no new guidance at the moment since [27] November 2024 and asked to use post HPAI data for context; generally NatureScot are more precautionary where they are aware that HPAI has led to further population declines*." The Project suggested taking an approach similar to that done recently for Cenos Offshore Wind Farm, whereby long term population trends are presented for key SPA features with species accounts also provided to provide context of how trends have changed in relation to the effects of HPAI. NatureScot agreed to this approach.	potential effect of HPAI is outlined for each individual assessment. Context of potential effects of HPAI is also provided within **Volume 3, Appendix 12.1** of the **EIA Report** for key receptors.
NatureScot	969	24 June 2025, HRA Meeting.	Offshore and intertidal ornithology	**a. Gannet breeding season connectivity** The Project asked whether connectivity can be ruled out for certain SPAs (specifically for Sule Skerry and Sule Stack SPA and North Rona and Sula Sgeir SPAs) based on gannet's known behaviour of space partitioning between colonies. "*NatureScot responded that no connectivity cannot be concluded due to lack of tracking data or due to NatureScot having low confidence in the tracking data available. NatureScot said that the Apportioning process will account for the likely limited connectivity to more distance sites*. "	At the request of NatureScot, the gannet (*Morus bassanus*) feature of Sule Skerry and Sule Stack SPA and North Rona and Sula Sgeir SPA are now screened in for assessment for potential effects during the breeding season. To note, the Project considers the potential for connectivity during the breeding season to be implausible based on the known space partitioning behaviour of gannets (Wakefield *et al.* 2013).

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
NatureScot	970	24 June 2025, HRA Meeting.	Offshore and intertidal ornithology	**b. Consideration of fulmar, shearwaters and petrels for Appropriate Assessment** The Project acknowledged the request made by NatureScot to further consider assessments for fulmar, shearwaters and petrels. The Project suggested undertaking a literature review with reference to tracking data to deliver a qualitative assessment. "*NatureScot agreed that the proposed approach is appropriate and asked the Project to refer to the ScotMer review and aerial survey data.*"	As requested, further consideration of these species is provided in **Section 6.2.17**.
NatureScot	972	24 June 2025, HRA Meeting.	Offshore and intertidal ornithology	***"Thresholds for in-combination PVA*** *Within both Environmental Impact Assessments (EIA) and Habitat Regulations Appraisals (HRA), the predicted impacts of offshore wind developments need to be considered against relevant marine bird populations. The primary method used for assessing the population consequences in these assessments is population viability analysis (PVA).* *Our advice on the requirement for PVA is as follows:* *Project alone impacts* • *PVAs will be required for all sites and species where the project alone impacts equal or exceed a 0.02 percentage point change in combined breeding and non-breeding season adult survival rate (i.e. a ≥0.02 percentage point decrease in survival rate or a ≥ 0.02 percentage point increase in mortality rate)* • *This could apply to any level of project alone mortality, though in reality it is unlikely that a very low project alone mortality will meet this threshold. However, annual adult mortality and changes in adult survival rate values should be presented for all sites and species, thereby providing clarity on when PVA is required.* *In-combination impacts*	The Project can confirm that the advised threshold of 0.02 percentage point change in combined breeding and non-breeding season adult survival rate has been used to determine requirements for PVA. Details of the methodology followed for PVA modelled and subsequent outputs is provided in detail within **Appendix D**. When concluding assessments involving PVA outputs, the Project can confirm that the recommended factors provided have formed the basis of conclusion drawn.

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
				• PVAs will generally be required for all sites and species where the in-combination impacts equal or exceed a 0.02 percentage point change in combined breeding and non-breeding season adult survival rate. (i.e. a ≥0.02 percentage point decrease in survival rate or a ≥ 0.02 percentage point increase in mortality rate) *• We no longer advise applying a threshold for the requirement of an in-combination PVA based on the project-alone mortality contribution (number of birds per annum). Due to Adverse Effect on Site Integrity being predicted at several SPAs (particularly on the east coast of Scotland), any project-alone mortality contribution which results in an in-combination impact equal to or exceeding a 0.02 percentage point change in annual adult survival rate will require a PVA. This applies to both EIA and RIAA assessments.* *Table 1: Scenarios for PVA thresholds* *When interpreting the results of the PVA, it is important to look at counterfactuals even where there is only a small project contribution, as we consider this along with a number of other factors. These include:* *• Proposed development scale and location* *• Colony and species-specific contextual elements* *• Long term colony trends* *• Short-term colony trends* *• Species life history* *• Proportional importance of species in Scotland and UK* *• HPAI and mortality event impacts (e.g. wrecks)* *• Climate change sensitivity* *• Confidence in the environmental impact assessment undertaken.* *Due to the high number of offshore wind projects currently being developed there is potential for even very small additional mortality to be of concern for certain species at certain sites. For*	

Stakeholder	Stakeholder issue ID	Date, document, forum	Aspect	Stakeholder comment	How is this addressed in the RIAA
				example, species with smaller populations such as great black-backed gull, are likely to be significantly impacted by a comparably smaller predicted impact."	

4. Environmental Baseline Conditions

4.1 Marine mammals

4.1.1 Introduction

4.1.1.1 This Section presents the baseline conditions and assessment scope for marine mammals in relation to the Project. The assessment focuses on the potential impacts to designated features of the Moray Firth SAC, specifically bottlenose dolphin. The approach is consistent with relevant guidance and reflects stakeholder feedback received during the HRA Screening process (see **Table 3.1**).

4.1.2 Temporal scope

4.1.2.1 The temporal scope of the assessment of marine mammals is the entire lifetime of the Project, which therefore covers the pre-construction, construction, operation and maintenance (O&M), and decommissioning stages. Construction of the offshore infrastructure is anticipated to last up to 12 years. It is anticipated that the construction of the Project will commence in 2030, with the first phase becoming fully operational by 2037. It is anticipated that the second phase of the Project would become fully operational by 2040 and the third phase by 2043. The operational lifetime of the Project for each phase is expected to be 35 years. **Plate 2.9** outlines the estimated temporal scope for activities relevant for marine mammals.

4.1.3 Desk study and survey methods

4.1.3.1 Baseline data used in this RIAA for marine mammals are consistent with those presented in **Volume 3, Appendix 11.1: Marine Mammal Baseline Technical Report** of the **EIA Report** and summarised in Section 11.5 and 11.6 of **Volume 1, Chapter 11: Marine Mammals** of the **EIA Report**. These include:

- monthly site-specific DAS undertaken between April 2021 and March 2023 across the Project OAA plus a 4km buffer;
- publicly available datasets and published literature;
- information on the management unit (MU) population; and
- Designated site information for the Moray Firth SAC.

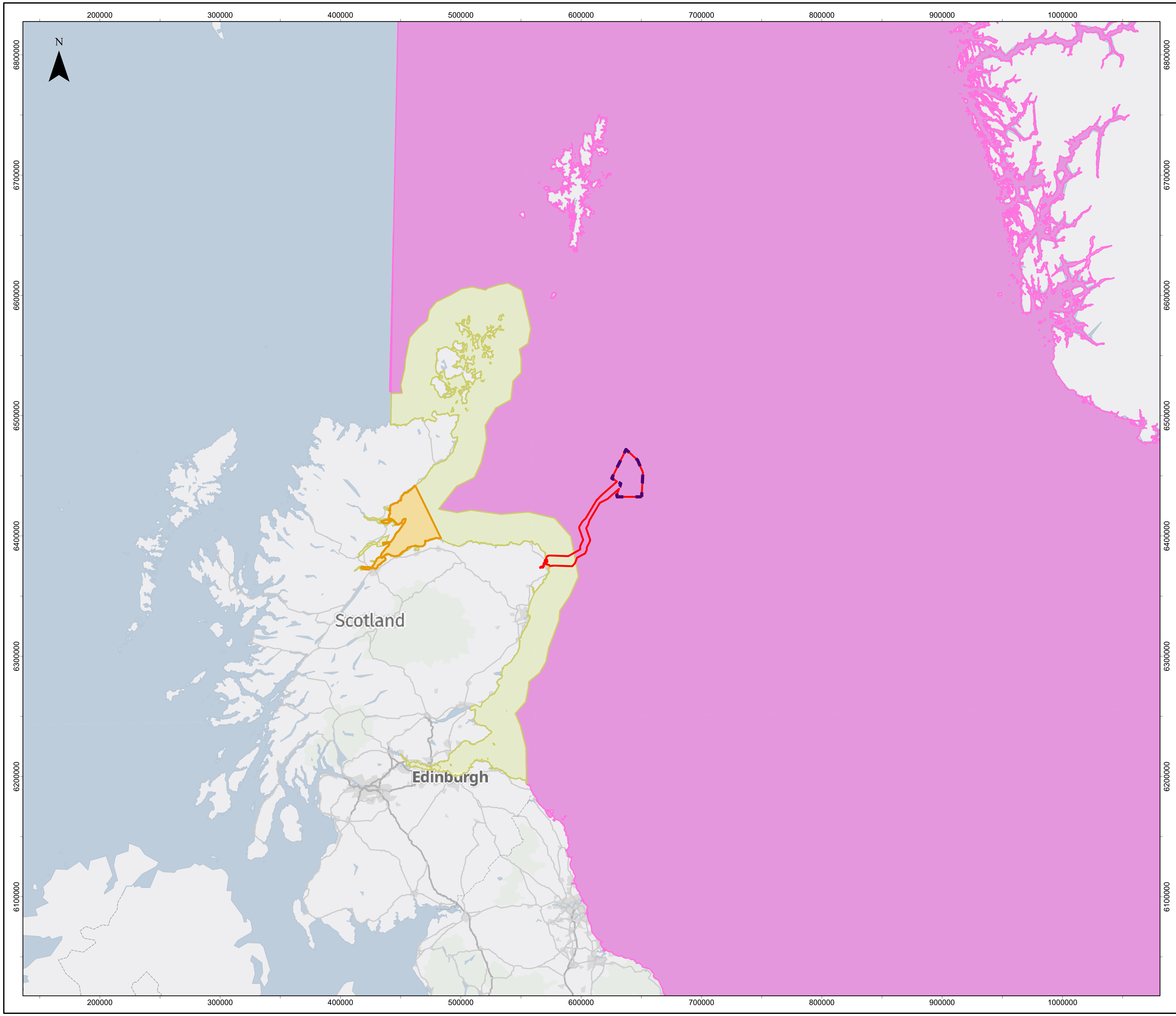
4.1.3.2 The spatial scope of the marine mammal assessment encompasses the Project OAA and offshore export cable corridor to landfall(s). This scope is extended to include the bottlenose dolphin MUs that are overlapped by the Project OAA and offshore export cable corridor, as defined by the Inter-Agency Marine Mammal Working Group (IAMMWG, 2023):

- Greater North Sea MU: covering the Project OAA and part of the offshore export cable corridor.
- Coastal East Scotland (CES) MU: including the coastal section of the offshore export cable corridor and landfall(s), supporting the protected coastal population associated with the Moray Firth SAC. The CES MU lies approximately 50km from the Project OAA.

4.1.3.3 The spatial scope has been extended in order to capture the ZOI of all impacts, some of which are potentially large (for example, underwater noise (UWN) disturbance impacts).

The ZOI was initially outlined in the EIA Scoping Report (MarramWind Limited, 2023) and HRA Screening Report (MarramWind Limited, 2024).

4.1.3.4 As outlined in the HRA Screening Report (see **Table 3.1**), the only designated site screened in for marine mammals is the Moray Firth SAC, designated for bottlenose dolphin. Connectivity with the Moray Firth SAC was identified based on potential interaction with the qualifying feature species (Criterion 2). The Moray Firth SAC lies approximately 150km west of the Project OAA and 90km away from landfall(s) (see **Figure 2**). No other SACs or qualifying species are screened in for this marine mammal assessment.



Red Line Boundary
Option Agreement Area
Moray Firth SAC
Cetacean Management Unit (MU)
Greater North Sea
Coastal East Scotland

0 50 100 Kilometres

REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER
	dd/mm/yyyy	--	--	--	--
2	22/10/2025	EH	LT	MR	NC
1	26/09/2025	EH	LT	MR	NC

WSP DRAWING NUMBER 808368-WEIS-IA-R4-FG-F4-15544

MarramWind DRAWING NUMBER MAR-GEN-ENV-MAP-WSP-000593

DATUM ETRS 89 PROJECTION UTM Zone 30N

SCALE 1:3,000,000 PAGE SIZE A3

PROJECT TITLE
MarramWind Offshore Wind Farm

DRAWING TITLE
Figure 2 Bottlenose dolphin CES MU and the Project
Report to Inform Appropriate Assessment (RIAA)

NOT TO BE USED FOR NAVIGATION

wsp MarramWind

4.1.4 Summary of surveys and desk studies

Project site-specific surveys

4.1.4.1 No sightings of bottlenose dolphin were recorded during the site-specific DAS. It is noted that given the spatial separation between the site-specific survey area and the typical ranging pattern of bottlenose dolphin from the Moray Firth SAC, it would not be expected to detect bottlenose dolphins from this specific population in the DAS.

4.1.4.2 While several marine mammal species were observed during the site-specific DAS, including Annex II species such as harbour porpoise (*Phocoena phocoena*) and grey seal (*Halichoerus grypus*), these are not qualifying features of the Moray Firth SAC and are therefore excluded from further discussion.

CES MU and Moray Firth SAC

4.1.4.3 Two distinct ecotypes of bottlenose dolphin are recognised in UK waters: a wide-ranging offshore type; and an inshore or coastal type, more likely to be site or area faithful (IAMMWG, 2023). In Scottish coastal waters, bottlenose dolphins typically inhabit coastal areas, within 2-5km from the shore and at depths of less than 30m, with the most frequent use of water depths between 2m and 20m (Quick et al., 2014; Cheney et al., 2013).

4.1.4.4 There is a well-studied resident population of bottlenose dolphins in the coastal waters of East Scotland. This population is a qualifying feature of the Moray Firth SAC, the only SAC to support a known resident population of this species in the North Sea. The site was selected in 2005 on the basis of long-term, regular use by this relatively small and genetically isolated coastal population, which has been subject to intensive research since 1989 through photo-identification studies and other monitoring programmes (NatureScot, 2025c; Cheney et al., 2024).

4.1.4.5 The Moray Firth SAC is located within the CES MU. The Moray Firth SAC bottlenose dolphin population uses the functionally linked habitat within the CES MU. The SAC population distribution can be considered synonymous with the extent of the CES MU. Therefore, information on the population size, density, and distribution for the Moray Firth SAC is considered at the CES MU scale. The current population size estimate for the CES MU is 226 individuals (95% CI: 214 to 239; Cheney et al., 2024). The CES MU population is functionally linked to the Moray Firth SAC and forms the basis of connectivity considerations in this RIAA. Note that, the Moray Firth SAC population is considered separate to the population in the Greater North Sea MU therefore impacts are not assessed against this MU.

Distribution and occurrence

4.1.4.6 Acoustic monitoring from the East Coast Marine Mammal Acoustic Study between 2011 and 2016 confirmed year-round presence of bottlenose dolphin in the Moray Firth, with peak occurrences during the Summer, but continued detections throughout most Winter months (Cheney et al., 2024; Palmer et al., 2019). Similar trends have been observed for other areas in the CES MU such as the Tayside area which has also been surveyed in Summers between 2017-2022. Indeed, there has been a recent decline in the absolute number of dolphins using the SAC in Summer, which could be due to an increase in individuals using other areas in this season (Cheney et al., 2024).

4.1.4.7 Long-term photo-identification studies have demonstrated strong site fidelity within the population, with individuals recorded over multiple decades since data collection first started in 1989 (Wilson et al., 2004). More than 50% of the CES MU are regularly known to use the area within the SAC annually, but individuals are also known to range well beyond the site, along the full east coast of Scotland, from northern areas down to Berwickshire (Cheney et al., 2024; Arso Civil et al., 2019; Cheney et al., 2013).

4.1.4.8 Whilst bottlenose dolphins are present in the SAC throughout the year, May to September is particularly important for breeding and calving, with adults observed with juveniles or calves regularly recorded throughout the Moray Firth SAC (NatureScot, 2025c). Males are also considered to spend more time outside the SAC than females, contributing to broader ranging patterns (Quick et al., 2014).

Abundance and density

4.1.4.9 The abundance of the CES MU population of bottlenose dolphin, which includes the Moray Firth SAC population, is currently estimated at 226 individuals, based on a weighted mean of annual estimates from 2020-2022 (Cheney et al., 2024). Long-term monitoring between 2001 and 2022 has shown that the number of dolphins using the SAC has remained stable, despite inter-annual fluctuations (Cheney et al., 2024). Moreover, sightings data show an increasing number of individuals using areas outside the SAC, with notable increases in Tayside and surrounding waters between 2019 and 2022, representing an approximate 4.8% annual increase (Cheney et al., 2024). This expansion in distribution suggests the population is not restricted to the SAC or the wider Moray Firth, reinforcing the importance of considering connectivity across the CES MU when assessing potential impacts (Cheney et al., 2024; 2018; 2014). The relative isolation and small size of the CES MU population heighten its vulnerability to both natural and anthropogenic influences.

4.1.4.10 There are few density estimates for bottlenose dolphin in eastern Scotland, and they have limited applicability to the CES MU population. Large-scale surveys, such as the small cetacean in European Atlantic and North Sea (SCANS), assume uniform distribution across a broad regional survey block, which does not reflect coastal bottlenose dolphin's preference for nearshore habitats or their tendency to form groups (Hammond et al., 2021). Quick et al. (2014) reported that bottlenose dolphins from the CES MU are more likely to be encountered within 2km of the coast. As a result, applying the block-wide density across the entire area is unsuitable for the coastal bottlenose dolphin population (CES MU) and would misrepresent their likely distribution in impact assessments.

4.1.4.11 For the purpose of this assessment and the assessment in **Volume 1, Chapter 11: Marine Mammals** of the **EIA Report**, two separate density estimates have been used, to reflect the highly coastal distribution where elevated densities are expected, in contrast to their expected distribution in the wider seas. A density estimate of 0.116 individuals/km² has been applied within 2km of the coast and is based on assumed uniform distribution of the population size (226 individuals; Cheney et al., 2024) in the 2km coastal band within the CES MU. A density estimate of 0.0298 individuals/km² has been applied to the wider seas, including the area of the CES MU outside of the 2km coastal band, based on the SCANS-III block R density estimate for bottlenose dolphin (Hammond et al., 2021; this older estimate is being used as a precautionary measure due to no bottlenose dolphins being sighted within the relevant SCANS-IV blocks (Gilles et al., 2023)).

Ecology and conservation status

4.1.4.12 The Moray Firth SAC supports shallow, sandy sediments habitats which are important nursery, feeding and migration areas for several fish species, including key prey species for the bottlenose dolphins such as Atlantic salmon (*Salmo salar*), sea trout (*Salmo trutta*), cod (*Gadus morhua*), herring (*Clupea harengus*), mullet (*Chelon labrosus*), eels (*Anguilla anguilla*), and squid (*Loligo* spp.) (NatureScot, 2025c; Santos et al., 2001). Other prey species important in the diet of bottlenose dolphins from this population include flatfish, mackerel, *(Scomber scombrus*), saithe (*Pollachius virens*), whiting (*Merlangius merlangus*), haddock (*Melanogrammus aeglefinus*), and cephalopods (Santos et al., 2001). Many of these fish species are dependent on sandeels and sprat availability.

4.1.4.13 Salmonids (particularly Atlantic salmon and sea trout) are considered key prey species, with increased dolphin presence in the Summer months often coinciding with their seasonal migrations through the Moray Firth area (NatureScot, 2025c; Santos et al., 2001).

4.1.4.14 Bottlenose dolphins are long-lived, slow-reproducing mammals, with inter-birth intervals ranging from two to nine years (typically around three years; NatureScot, 2025c). Between 2001 and 2022, 297 calves were identified along the east coast population, with annual births ranging from three to 22 (Cheney et al., 2024). Calving rates appear to be increasing both within and beyond the SAC, although not all calves are detected in their year of birth (NatureScot, 2025c; Cheney et al., 2024).

4.1.4.15 The condition of bottlenose dolphin at the Moray Firth SAC was assessed as favourable in the most recent site condition monitoring undertaken in 2022 (NatureScot, 2025c; Cheney et al., 2024).

4.1.5 Data limitations

4.1.5.1 The assessment of bottlenose dolphin, the qualifying feature of the SAC, is based on a range of data sources including site-specific surveys, regional datasets, and local population monitoring. While these provide a strong foundation for understanding distribution and space use, some limitations remain.

4.1.5.2 Numerous studies monitoring bottlenose dolphin populations around Scotland primarily use photo-ID and passive acoustic monitoring (Arso Civil *et al.,* 2021; 2019; Cheney *et al*., 2024; 2018; 2014). These methods are effective for understanding population structure, individual movements, and long-term trends, but cannot produce spatially explicit density estimates. Consequently, while these studies greatly improve knowledge of coastal dolphin distribution, they are not suitable for generating densities for the purpose of an impact assessment. Therefore, due to the absence of published spatially-explicit density estimates, a uniform CES MU density estimate has been used for the Project, based on the most recent CES population estimates (see **Volume 3, Appendix 11.1** of the **EIA Report**). Although this approach assumes even distribution, despite known spatial variability, it remains the most practical solution available.

4.1.5.3 DAS were undertaken monthly from April 2021 to March 2023 across the Project OAA and a 4km buffer. While these surveys provide valuable spatial coverage offshore, they are inherently constrained by environmental conditions such as weather, daylight, and sea state. Additionally, DAS data represent 'snapshots' in time and rely on surface detections, which may underrepresent individuals with low surface presence or cryptic behaviour. It is noted that the extent of the DAS did not overlap with the CES MU or Moray Firth SAC. Through consultation on the HRA Screening Report, it was noted by NatureScot and MD-LOT that the DAS extent may not fully capture wider patterns of marine mammal distribution. No bottlenose dolphin sightings were recorded during the DAS period, and the Moray Firth SAC population is understood to occupy nearshore habitats located well to the south of the Project OAA. Despite these limitations, the assessment draws on the best available evidence and methods appropriate to the SAC and qualifying feature, ensuring a robust and proportionate evaluation of potential impacts.

4.1.5.4 Further detail on marine mammal data limitations, including those relevant to bottlenose dolphin, is provided in Section 11.5.4 of **Volume 1, Chapter 11: Marine Mammals** of the **EIA Report**.

4.2 Offshore and intertidal ornithology

4.2.1 Introduction

4.2.1.1 The current baseline conditions relating to offshore and intertidal ornithology are summarised within Section 12.4 to 12.6 of **Volume 1, Chapter 12: Offshore and Intertidal Ornitholog**y of the **EIA Report**. For both offshore and intertidal receptors, this is predominantly drawn from site-specific surveys undertaken which are summarised below and discussed in detail in **Volume 3, Appendix 12.1** of the **EIA Report**.

4.2.2 Temporal scope

4.2.2.1 The temporal scope of the assessment of offshore and intertidal ornithology is the entire lifetime of the Project, which therefore covers the construction, O&M, and decommissioning stages. Construction of the offshore infrastructure is anticipated to the last up to 12 years, commencing in 2030, and will be delivered in phases according to the indicative construction programme. Each phase of the Project is expected to have an operational lifetime of approximately 35 years.

4.2.3 Desk study and survey methods

Desk study

4.2.3.1 The data sources that have been collected and used to inform this offshore and intertidal ornithology assessment are summarised in **Table 4.1**.

Table 4.1 Offshore and intertidal ornithology desk-based data sources

Source	Date	Summary
Bird records from the North East Scotland Biodiversity Record Centre (NESBReC) and the North East Scotland Scottish Ornithologists' Club (SOC) Bird Recorder, British Trust for Ornithology (BTO) Wetland Bird Survey (WeBS) Data, as well as any other relevant bodies identified	Various	Intertidal and nearshore bird records to inform on abundance and distribution of species within the intertidal ZOI.
The BTO Bird Atlas (Balmer et al. 2013), Birds of Scotland (Forrester et al. 2007), the Aberdeenshire County Bird Report (SOC, multiple years), The Breeding Birds of North-East Scotland (Francis et al. 2011), and any other relevant publications identified	Various	Intertidal and nearshore bird records and ecology to inform on abundance and distribution of species within the intertidal ZOI.
Wade *et al.* 2016; Furness *et al.* 2013; Furness *et al.* 2012; Langston 2010;	Various	Guidance and research – sensitivity of birds to offshore wind farms.

Source	**Date**	**Summary**
Stienen *et al.* 2007; Drewitt and Langston 2006; Garthe and Hüppop 2004		
Buckingham *et al.* 2022; NatureScot, 2023f; SNCBs 2017, updated 2022; Dierschke *et al.* 2016; Masden *et al.* 2012, 2010; Speakman *et al.* 2009	Various	Guidance, research and methodology – offshore wind farm displacement / barrier effects on birds.
SNCBs, 2024; Woodward *et al.* 2023; NatureScot, 2025c; Bowgen and Cook 2018; McGregor *et al.* 2018; Skov *et al.* 2018; Cook *et al.* 2014; Johnston *et al.* 2014a and b; Band 2012; Wright *et al.* 2012; Cook *et al.* 2012	Various	Guidance, research and methodology – collision risk modelling, flight heights and avoidance rates for birds and offshore wind farms, including the Band deterministic model, the stochastic model and the migratory species model.
NatureScot, 2023g	Various	Population viability analysis modelling tool for seabirds.
Cleasby *et al.* 2020, 2018; Waggitt *et al.* 2020; Woodward *et al.* 2019; Wakefield *et al.* 2017, 2013; Kober *et al.* 2010; Stone *et al.* 1995	Various	Seabird foraging ranges and distribution at sea.
NatureScot, 2023d; NatureScot, 2020a; Furness 2015; Mitchell *et al.* 2004; JNCC seabird monitoring programme (SMP) database; designated site citations / departmental briefs / conservation advice from the websites of SNCBs	Various	Bird population estimates.
Relevant documents from marine licence applications for other offshore wind farms in UK offshore waters (in particular Scottish and English East Coast Waters), and Transboundary offshore wind farms	Various	Information and data for in-combination assessments.
Relevant ecological studies for species included in EIA (peer reviewed scientific papers and 'grey' literature), including postconstruction monitoring studies (for example, Moray Firth Regional Advisory	Various	Other empirical evidence and studies relevant to assessment.

Source	Date	Summary
Group https://marine.gov.scot/ml/moray-firthregional-advisory-group-mfrag), Kincardine Offshore Wind Farm bird collision study (KOWL, 2019), Offshore Renewables Joint Industry Programme (ORJIP) collision avoidance study (Skov *et al.* 2018)		

Site surveys

4.2.3.2 Baseline data used in this RIAA for offshore and intertidal ornithology are consistent with those presented in **Volume 3, Appendix 12.1** of the **EIA Report**, and summarised in Section 12.5 of **Volume 1, Chapter 12: Offshore and Intertidal Ornithology** of the **EIA Report**. These include:

- monthly site-specific DAS undertaken between April 2021 and March 2023 across the Project OAA plus a 4km buffer;
- monthly vantage point (VP) surveys undertaken by APEM and conducted between September 2022 and August 2023 across the proposed landfall sites; and
- publicly available datasets and published literature.

4.2.3.3 The spatial scope of the offshore and intertidal ornithology assessment is defined as the wind farm OAA covering a surface area of 684km^2 and associated offshore export cable corridor study area, covering a surface area of 575km^2 (see **Volume 2, Figure 12.1: Offshore and intertidal ornithology study area**). The OAA is the spatial boundary of the NE7 Plan Option, as defined in the Scottish Government's Sectoral Marine Plan for Offshore Wind Energy (Scottish Government, 2020b) and is located 75km offshore of the north-east Aberdeenshire coastline, Scotland and has formed the basis of the study area described in this Section.

4.2.3.4 The offshore ornithology study area comprises the proposed OAA, a surrounding 4km buffer, the area of sea within and in close proximity to the export cable corridor and the nearshore environment seaward of MHWS from the proposed cable landfalls.

4.2.3.5 The intertidal ornithology study area for the assessment of effects on waterbirds in the intertidal zone covers the coastal area between MHWS and MLWS at the proposed landfall locations within which intertidal bird surveys were carried out over 12 months to cover the breeding and the non-breeding seasons. This study area covers the initial study area for the two landfall options (Scotstown and Lunderton) along the coastline, with areas extending between 1,380.3m and 2,183.3m in length respectively, with 500m survey buffers (inclusive of habitat seaward from MHWS), encompassing the whole intertidal area. Both landfall sites are located on the coastline north of Peterhead and are predominantly sandy beaches backed by marram grass (*Ammophila arenaria*) dominated dune systems.

4.2.4 Summary of surveys and desk studies

Option Agreement Area

4.2.4.1 Current baseline conditions within the OAA have been recorded during 24 months of DAS data collection across the OAA plus 4km buffer, representing the relevant study area for offshore ornithological receptors as outlined above. Across the 24 months of DAS, 20 species were recorded with an overview of occurrence provided in **Table 4.2** below. Of these, guillemot, fulmar, gannet, kittiwake and razorbill (*Alca torda*) were the most frequently encountered species, accounting for 95.4% of all birds recorded (guillemot (53.0%), fulmar (29.1%), gannet (6.5%), kittiwake (4.1%), razorbill (2.8%)).

Table 4.2 Overview of offshore ornithological receptors recorded in the Project OAA plus 4km buffer

Species	Frequency of occurrence over 24 surveys	Maximum predicted abundance estimate (and associated 95% CI) in the OAA plus 4km buffer
Guillemot	24	24,448 (22,158 to 26,964).
Fulmar	24	3,765* (1,328 to 7,353).
Gannet	24	2,814* (985 to 6,136).
Kittiwake	24	1,818 (1,261 to 2,473).
Razorbill	21	2,412 (1,973 to 2,863).
Puffin	16	1,064 (826 to 1,321).
Great black-backed gull (*Larus marinus*)	16	691 (131 to 1,669).
Herring gull	11	315 (107 to 598).
Great skua	4	54* (41 to 277).
Arctic tern (*Sterna paradisaea*)	4	124 (54 to 201).
European storm petrel (*Hydrobates pelagicus*)	2	298 (116 to 573).
Manx shearwater (*Puffinus puffinus*)	2	17 (2 to 64).

Species	Frequency of occurrence over 24 surveys	Maximum predicted abundance estimate (and associated 95% CI) in the OAA plus 4km buffer
Arctic skua (*Stercorarius parasiticus*)	2	8 (1 to 23).
Lesser black-backed gull (*Larus fuscus*)	2	8 (1 to 32).
Ruff (*Calidris pugnax*)	1	80 (10 to 241).
Common gull (*Larus canus*)	1	23 (3 to 54).
Little auk (*Alle alle*)	1	25 (3 to 58).
Woodcock (*Scolopax rusticola*)	1	16 (2 to 40).
Red-throated diver (*Gavia stellata*)	1	8 (1 to 24).
Whimbrel (*Numenius phaeopus*)	1	8 (1 to 32).

Table note: *DAS data collected from August 2021 included a significant bias on the density and abundance of gannet, fulmar and great skua recorded due to an attraction effect to a commercial fishing vessel within the survey area. This has resulted in a peak of bird counts that is considered above normal or expected levels. The Project took the approach to exclude the August 2021 data from assessment as discussed and agreed with NatureScot. As such the maximum predicted abundance estimate for these species represents the next highest totals for each species.

Offshore export cable corridor (including offshore export cables)

4.2.4.2 Screening followed the recommended approach within NatureScot's Guidance Note 3 & 4 (NatureScot, 2023b & 2023c), which did not identify the potential for any connectivity to designated sites in relation to the zone of influence from the offshore element of the export cable corridor, with the exception of the nearshore element which intersects Buchan Ness SPA. In addition, due to the offshore export cable corridor not intersecting areas of known significant concentrations of sensitive seabirds, such as common scoter (*Melanitta nigra*) or red-throated diver, or important bird areas such as SPAs, specific baseline data for this area were not collected and are, therefore, not included. As any potential impacts occurring within the offshore export cable corridor are expected to be spatially and temporally restricted, these are, therefore, not considered in detail. However, consideration is provided for nearshore waters in **Section 6.3**, where data were collected to inform the potential impacts from landfall activities.

Landfall(s) (up to mean high water springs)

4.2.4.3 During VP surveys in the two proposed landfall sites, 42 species were recorded (**Table 4.3**). These species were distributed widely across within the survey area, although overall use of the intertidal area was limited at both Scotstown and Lundeton. With the exception of discrete roosting and loafing areas on intertidal rocks, located at the southern edge Scotstown and both the northern and southern areas of Lunderton. Which were typically used by waders, gulls and shag (*Phalacrocorax aristotelis*).

4.2.4.4 Of the species recorded, the most abundant species were all recorded at Scotstown, including shag (peak count of 820 in August 2023), common gull (peak count of 427 in March 2023), razorbill (peak count of 350 in July 2023), gannet (peak count of 300 in October 2022), Arctic tern (peak count of 265 in early May 2023), herring gull (peak count of 260 in early May 2023), guillemot (peak count of 230 in August 2023) and eider (*Somateria mollissima*) (peak count of 120 in August 2023).

Common scoter and wigeon (*Mareca penelope*) were also recorded in notably high numbers during VP surveys. One survey in early May 2023 recorded a peak count of 700 common scoter at Lunderton. Wigeon were recorded in large numbers during three surveys with a peak of 320 individuals at Scotstown in November 2022. Both species were not recorded outside of spring and autumn migration months, so these records are considered to represent pulses of migratory flocks passing through the area.

4.2.4.5 An overview of species recorded and the temporal range of records across both landfall sites is presented in **Table 4.3**. Species recorded in important numbers (>1% of an SPA, Ramsar or SSSI population that may have connectivity with the proposed landfall sites and associated buffers, or >1% of the UK or international population) are highlighted bold.

Table 4.3 Overview of intertidal ornithological receptors recorded during site-specific vantage point surveys at the two proposed landfall sites

Species group	Species	Scotstown survey peak count	Lunderton survey peak count	Temporal range of records across both landfall sites
Waterfowl	Pink-footed goose	1	2	September to October
	Gadwall	30	0	September
	Wigeon	320	4	September to November
	Eider	**120**	**100**	Present year-round
	Common scoter	0	700	May
	Long-tailed duck (*Clangula hyemalis*)	30	4	October to March

Species group	Species	Scotstown survey peak count	Lunderton survey peak count	Temporal range of records across both landfall sites
	Goldeneye (*Bucephala clanbgula*)	0	3	February to March
	Red-breasted merganser (*Mergus serrator*)	3	23	March to June
Waders	Oystercatcher (*Haematopus ostralegus*)	20	20	Present year-round
	Lapwing (*Vanellus Vanellus*)	190	0	November to February
	Golden plover (*Pluvialis apricaria*)	260	0	October to February
	Grey plover (*Pluvialis squatarola*)	0	1	September
	Ringed Plover (*Charadrius hiaticula*)	65	30	January to May and also recorded in August.
	Whimbrel	15	0	August to September.
	Curlew (*Numenius arquata*)	20	5	Present year-round.
	Bar-tailed godwit (*Limosa lapponica*)	1	0	October
	Turnstone (*Arenaria* spp.)	20	13	Recorded in all months.
	Knot (*Calidris canutus*)	24	1	August
	Sanderling (*Calidris alba*)	38	16	August to December and also recorded in May.
	Dunlin (*Calidris alpina*)	6	13	July to March and also recorded in May.
	Purple sandpiper (*Calidris maritima*)	9	25	October to May.

Species group	Species	Scotstown survey peak count	Lunderton survey peak count	Temporal range of records across both landfall sites
	Redshank (*Tringa tetanus*)	35	36	July to May.
All other target species	Kittiwake	110	45	May to November.
	Black-headed gull (*Chroicocephalus ridibundus*)	159	150	Present year-round.
	Common gull	427	98	March to December.
	Great black-backed gull	25	18	Present year-round.
	Herring gull	**260**	83	Present year-round.
	Lesser black-backed gull	2	3	July to September and also recorded in May.
	Sandwich tern (*Thalasseus sandvicensis*)	**70**	**45**	May to August
	Arctic tern	265	0	May to August.
	'Commic' tern (Unidentified Arctic tern / common tern	0	110	May
	Arctic skua	1	1	May, July and October.
	Common guillemot	**230**	162	Present year-round
	Razorbill	350	150	Present year-round
	Black guillemot (*Cepphus grille*)	0	1	August
	Puffin	2	1	February, March, August and October.

Species group	Species	Scotstown survey peak count	Lunderton survey peak count	Temporal range of records across both landfall sites
	Red-throated diver	17	5	October to early May and also recorded in June.
	Black-throated diver	2	0	September
	Great northern diver (*Gavier immer*)	1	1	October
	Gannet	300	10	May to November.
	Shag	**820**	**295**	Present year-round
	Little egret (*Egretta garzetta*)	0	2	October

4.2.5 Data limitations

4.2.5.1 For intertidal ornithology, the primary data source is site-specific VP surveys, conducted over a 12-month period. Given the dynamic nature of the marine environment, bird distributions are expected to vary both spatially and temporally. Consequently, individual monthly surveys may not fully capture typical bird presence across the entire month. The same is also true for DAS data collected for offshore ornithological receptors. Despite this, both VP and DAS survey methodologies are in line with industry standard, with methodologies agreed with NatureScot during consultation (see **Volume 1, Chapter 12: Offshore and Intertidal Ornithology** of the **EIA Report**). As such, the survey data provides an appropriate indication of receptor presence, distribution and abundance for the purposes of this assessment.

4.2.5.2 During DAS data collection, unsuitable weather resulted in five of the 24 monthly surveys (November 2021, February, June and December 2022 and January 2023) being rearranged and flown in a different month to that planned, and three being flown over multiple days as a result of unsuitable weather conditions partway through the survey. The approach to DAS and the solution for missed survey months was discussed and agreed with NatureScot during consultation (see consultation and engagement within **Volume 1, Chapter 12 Offshore and Intertidal Ornithology** of the **EIA Report**). Despite these gaps, the DAS dataset is considered appropriate and fit for purpose for characterising the offshore ornithology baseline and assessing potential effects from the Project. For full details on the survey protocol see **Volume 3, Appendix 12.1** of the **EIA Report**.

4.2.5.3 It is also acknowledged that an outbreak of HPAI occurred across UK seabird colonies from 2021 onwards, coinciding with the collection of DAS data for the Project. HPAI affected several key species, including gannet, guillemot, razorbill, puffin, and kittiwake, with notable mortality events recorded. While DAS data remain valid for assessing at-sea distribution, potential impacts on colony size and productivity during the outbreak period are acknowledged and have been considered when interpreting baseline trends.

4.3 Terrestrial ecology and ornithology

4.3.1 Introduction

4.3.1.1 The HRA Screening Report (see **Appendix A**), concluded that four sites would be taken forward for onshore ornithology consideration, all for a single species – pink-footed goose (*Anser Brachyrhynchus*). In addition to Loch of Strathbeg SPA / Ramsar – pink-footed goose (non-breeding) (Criterion 2 and 3), the following were identified: Ythan Estuary, Sands of Forvie and Meikle Loch SPA – pink-footed goose (non-breeding) (Criterion 2 and 3); and Ythan Estuary and Meikle Loch Ramsar – pink-footed goose (non-breeding) (Criterion 2 and 3).

4.3.1.2 Since production of the HRA Screening Report, which was produced at an earlier design stage, the scheme design has developed such that the Onshore Red Line Boundary is no longer situated to the south of Peterhead where birds were recorded, ruling out likely connectivity with the Ythan Estuary, Sands of Forvie and Meikle Loch SPA / Ythan Estuary and Meikle Loch Ramsar population.

4.3.1.3 Connectivity of the Project with the Loch of Strathbeg SPA / Ramsar was identified based on potential interaction with pink-footed geese (Criterion 2 and 3). The Loch of Strathbeg SPA / Ramsar lies approximately 5.5km to the north of the Onshore Red Line Boundary (at its nearest point) (see **Figure 3**).

4.3.1.4 Therefore, the only designated sites screened in for onshore Ecology and Ornithology are the Loch of Strathbeg SPA and the Loch of Strathbeg Ramsar (the boundaries of which are coincident), designated for pink-footed geese and other qualifying features (all features other than pink-footed geese having been screened out from further assessment). No other SPAs, SACs, Ramsar sites or qualifying species are screened in for this onshore ecology and ornithology assessment.

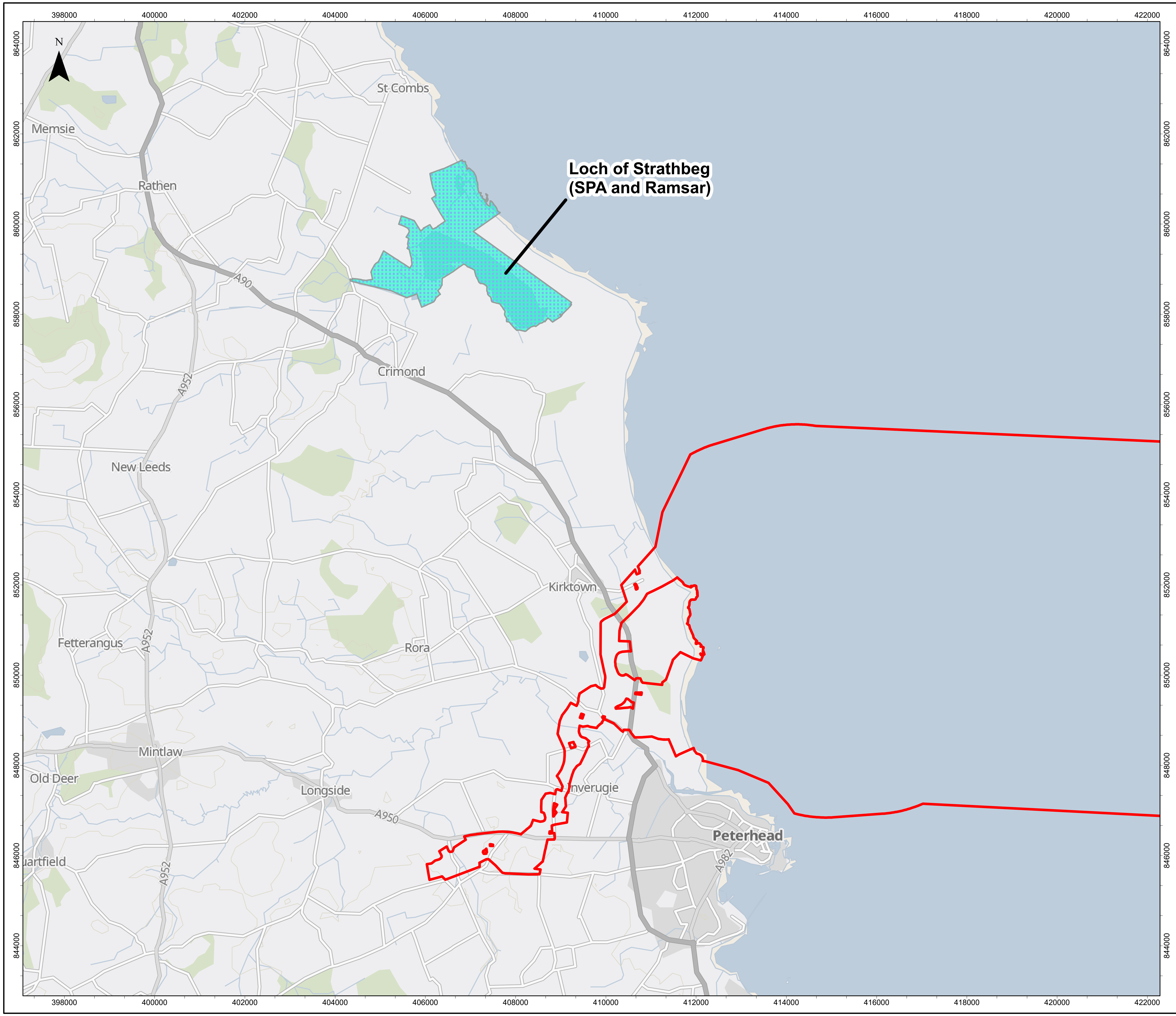
4.3.1.5 The assessment therefore focuses on the potential impacts to pink-footed geese, as a designated feature of the Loch of Strathbeg SPA. The approach is consistent with relevant guidance and reflects stakeholder feedback received during the HRA Screening process (see **Table 3.1**).

4.3.1.6 The following sections present the baseline conditions and assessment scope for Onshore Ecology and Ornithology in relation to the Project.

4.3.2 Temporal scope

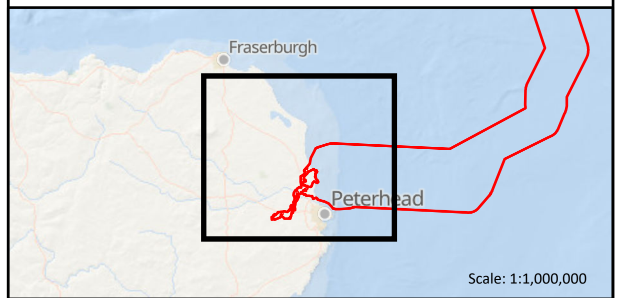
4.3.2.1 The temporal scope of the terrestrial ecology and ornithology assessment is the entire lifetime of the Project, which therefore covers the construction, O&M, and decommissioning stages.

4.3.2.2 Construction of the Project is anticipated to the last up to 12 years, commencing in 2030, and will be delivered in phases according to the indicative construction programme shown in **Plate 2.8**. Each phase of the Project is expected to have an operational lifetime of approximately 35 years.



	Red Line Boundary
	Ramsar Site
	Special Protection Area (SPA)

0 1,000 2,000 3,000 4,000 Metres



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DATUM	OSGB 1936	PROJECTION	British National Grid
SCALE	1:80,000	PAGE SIZE	A3

PROJECT TITLE

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Figure 3 Loch of Strathbeg SPA and Ramsar

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4.3.3 Desk study and survey methods

4.3.3.1 Baseline data used in this RIAA with respect to pink-footed geese is consistent with those presented in **Volume 3, Appendix 23.6: Winter Bird Report 2022/2023** and **Volume 3, Appendix 23.7: Winter Bird Report 2023/24**, and summarised in **Volume 1, Chapter 23: Terrestrial Ecology and Ornithology** of the **EIA Report**. These include:

- designated site information for the Loch of Strathbeg SPA / Ramsar;
- publicly available datasets and published literature:
  - NESBReC, the North East Scotland;
  - SOC's Bird Recorder, and other relevant bodies;
  - BTO Non-Estuarine Waterbird Surveys;
  - Wetland Bird Survey data;
  - Royal Society for the Protection of Birds (RSPB) data specific to the Loch of Strathbeg;
  - Scottish Bird Reports (Scottish Ornithologists' Club, 2025);
  - North East Scotland Bird Reports;
  - A survey of the feeding distribution of geese around the Loch of Strathbeg (Littlewood and Sideris, 2016); and
  - Goose flight activity in relation to distance from SPAs in Scotland, including an analysis of flight height distribution (Patterson, 2015).
- Winter season bird surveys undertaken between September 2022 and April 2023 and September 2023 to March 2024. The 'study areas' for these surveys are shown on **Volume 2, Figure 23.1: Ecological study areas**, and comprise:
  - the initial Scoping Boundary provided the study area within which initial wintering geese surveys were undertaken during the 2022 / 2023 winter season.
  - the Proposal of Application Notice Boundary was the study area within which wintering geese surveys were undertaken during winter 2023 / 2024 winter season.

4.3.3.2 The spatial scope of the assessment considers a ZOI of 500m from the Onshore Red Line Boundary for disturbance and displacement effects to pink-footed geese during construction, O&M and decommissioning stages of the Project. The ZOI was initially outlined in the EIA Scoping Report (MarramWind Limited, 2023) and HRA Screening Report (MarramWind Limited, 2024).

Site surveys

4.3.3.3 North-eastern Aberdeenshire is an important wintering area for geese, the majority of these being pink-footed geese. Most geese wintering in north-eastern Aberdeenshire roost overnight at the Loch of Strathbeg SPA and RSPB reserve. This is one of the main goose roosting sites in the UK which holds internationally important numbers of pink-footed geese. The main roost is found at the loch, with geese feeding in surrounding fields during the day (and on moonlit nights).

4.3.3.4 A programme of surveys was undertaken during the 2022 / 2023 and 2023 / 2024 winter seasons to gain an understanding of the distribution of geese and swans within and around the Onshore Red Line Boundary. Surveys sought to establish whether or not land is 'functionally linked,' for instance, where SPA species utilise non-designated habitats within the wider vicinity of the National Site Network. For the purposes of this Report, potential functional linkage for pink-footed geese was considered within 20km (SNH, 2016) of the Loch of Strathbeg SPA / Ramsar.

4.3.3.5 Surveys followed an approach adapted from that outlined in Littlewood and Sideris (2016) – A survey of the feeding distribution of geese around the Loch of Strathbeg. Distribution surveys followed a driven transect method used by Littlewood and Sideris (2016), who surveyed the feeding distribution of geese around the Loch of Strathbeg. The survey scope was also informed by the knowledge that most pink-footed geese in North-East Scotland forage within 20km of their roost site (Patterson, 2013).

4.3.3.6 Flight activity surveys were undertaken from vantage points to establish the baseline level of geese and swan flight activity (these surveys supplementing the distribution surveys). Six vantage points were adopted (following Littlewood and Sideris, 2016). Where current goose management scheme boundaries exist, the vantage points corresponded with these areas. The precise positions of vantage points were selected to allow clear views over as wide an area as possible, and to permit safe parking at the location or close by.

4.3.3.7 Due to the reduced study area and distance from the roost at Loch of Strathbeg, survey methods in 2023 / 2024 followed the driven transect method but did not incorporate vantage point / flight activity surveys, which formed a supplementary element to the wider scale coverage of the surveys in 2022 / 2023.

4.3.4 Summary of surveys and desk studies

4.3.4.1 No statutory designated sites are located south of St Fergus Gas Terminal within the Scotstown landfall, however non-designated agricultural land at the landfall(s) has been identified as providing functional connectivity with Loch of Strathbeg SPA / Ramsar on the basis that over-wintering pink-footed geese have been recorded foraging in the fields over the winter period (October to March). Further details are presented in **Volume 3, Appendix 23.6** and **Volume 3, Appendix 23.7** of the **EIA Report**.

4.3.4.2 Loch of Strathbeg SPA qualifies under Article 4.2 by regularly supporting populations of European importance of the migratory species: pink-footed goose (1986 / 1987 to 1990 / 1991, average winter peak count of 27,500 individuals, 25% of the Eastern Greenland / Iceland / UK biogeographic population).

4.3.4.3 The Loch of Strathbeg Ramsar site qualifies under Ramsar Criterion 6 by regularly supporting 1% or more of the individuals in a population of waterbirds: pink-footed goose (1986 / 1987 to 1990 / 1991, average winter peak count of 27,500 individuals, 25% of the Eastern Greenland / Iceland / UK biogeographic population).

4.3.4.4 By 2006, pink-footed geese had been recorded in greater peak numbers than listed in the SPA citation. Pink-footed geese peaked at 34,797 individuals in Spring / Autumn (an average of 14.4% of the Greenland / Iceland / UK population).

4.3.4.5 During the 2022 / 2023 and 2023 / 2024 winter season geese and swan surveys, pink-footed geese were recorded utilising agricultural land to the south of St Fergus Gas Terminal and surrounding fields. Birds were recorded throughout both winter periods until late March, with results summarised as follows:

- 2022 / 2023 survey season: Throughout the surveys, pink-footed goose flocks made regular use of the area within 3km of the Loch of Strathbeg. This was most pronounced between December and February. From September to November, these geese were more widely distributed, with an additional cluster southwest of Fraserburgh. In March, pink-footed goose groupings were evident around St Fergus, Rora and Kininmonth.

However, in April 2022, pink-footed geese were again clustered more tightly around the Loch of Strathbeg.

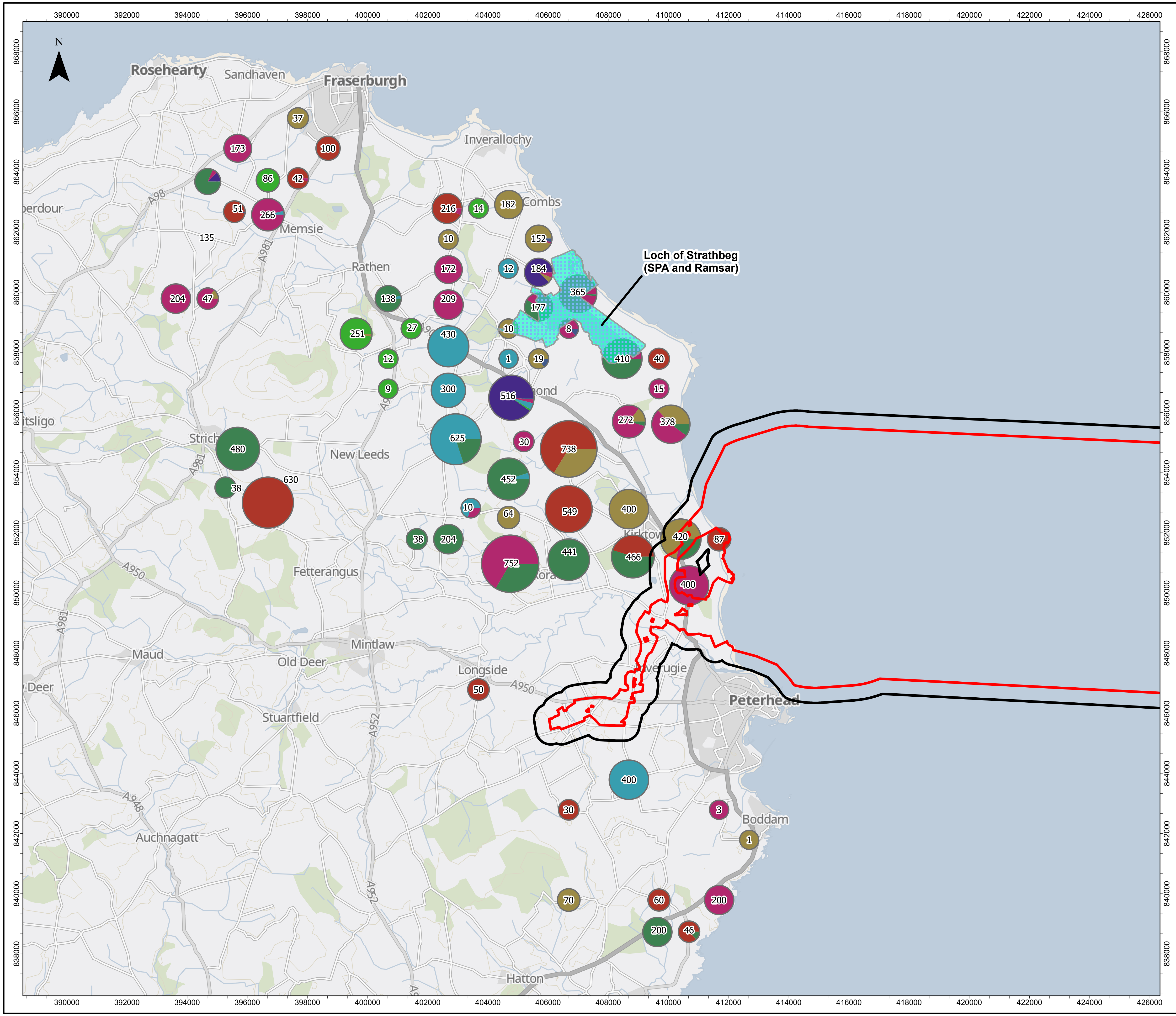
Areas at Crimond, west of Fraserburgh, northwest of the Loch of Strathbeg, and at Memsie and Kininmonth also supported large flocks during at least one visit.

The ‘goose hotspot’ south of the St Fergus gas terminal noted by Littlewood and Sideris (2016) was recorded throughout winter 2022 / 2023 until late March. Monthly distributions are illustrated on a combined distribution map (see **Figure 4**), where between 297 and a peak count of 700 pink-footed geese were recorded in this area during each of November, January, February and March. The peak count recorded equates to approximately 2.5% of the SPA population (JNCC, 2018).

- During the 2023 / 2024 surveys, goose flocks regularly used the area east of St Fergus. Between September and December, high numbers were also recorded in the area south of Sandfordhill and north of Buchan. Additional clusters were evident south to southwest of Kirktown / St Fergus (November and February), Lunderton (November and February) and southwest of Dales Industrial Estate (chiefly in January 2024). In March, birds were again clustered close to Buchan. Monthly distributions are illustrated on a combined distribution map (See **Figure 5**). Monthly counts (highest daily total) are shown in **Table 4.4** (locations are given in brackets).
- Goose flocks were recorded regularly in the area east of St Fergus, with a peak count of 1,150 in October 2023 (4.2% of the SPA Population). All areas of agricultural land found to support pink-footed geese are considered functionally linked with the SPA.

Table 4.4 Monthly pink-footed geese counts recorded in 2023 / 2024

Month / Year	North	South
September 2023	0	1,000 (Buchan).
October 2023	1,150 (St Fergus); 223 (Lunderton); 21 (Ednie); 200 (Moss of Auchlee).	1,500 (Longhaven).
November 2023	1,843 (St Fergus); 500 (Lunderton).	250 (Buchan).
December 2023	804 (St Fergus).	710 (Buchan); 1,550 (Sandfordhill).
January 2024	200 (St Fergus).	500 (Southwest of Dales Industrial Estate); 25 (South of Dales Industrial Estate).
February 2024	140 (St Fergus); 350 (Lunderton); 500 (Ednie).	11 (Hillhead of Cocklaw); 52 (Longhaven); 23 (Buchan).
March 2024	150 (Kirktown); 12 (St Fergus); 580 (Scotstown Head).	350 (Buchan); 50 (Hillhead of Cocklaw).



Red Line Boundary
500m buffer around the Red Line Boundary
Ramsar Site
Special Protection Area (SPA)

Pink-footed geese distribution (2022/2023)

September
October
November
December
January
February
March
April

0 2,000 4,000 6,000 Metres

Scale: 1:1,000,000

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DATUM	OSGB 1936	PROJECTION	British National Grid
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PROJECT TITLE MarramWind Offshore Wind Farm

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Figure 4 Pink-footed goose distribution (2022-2023)

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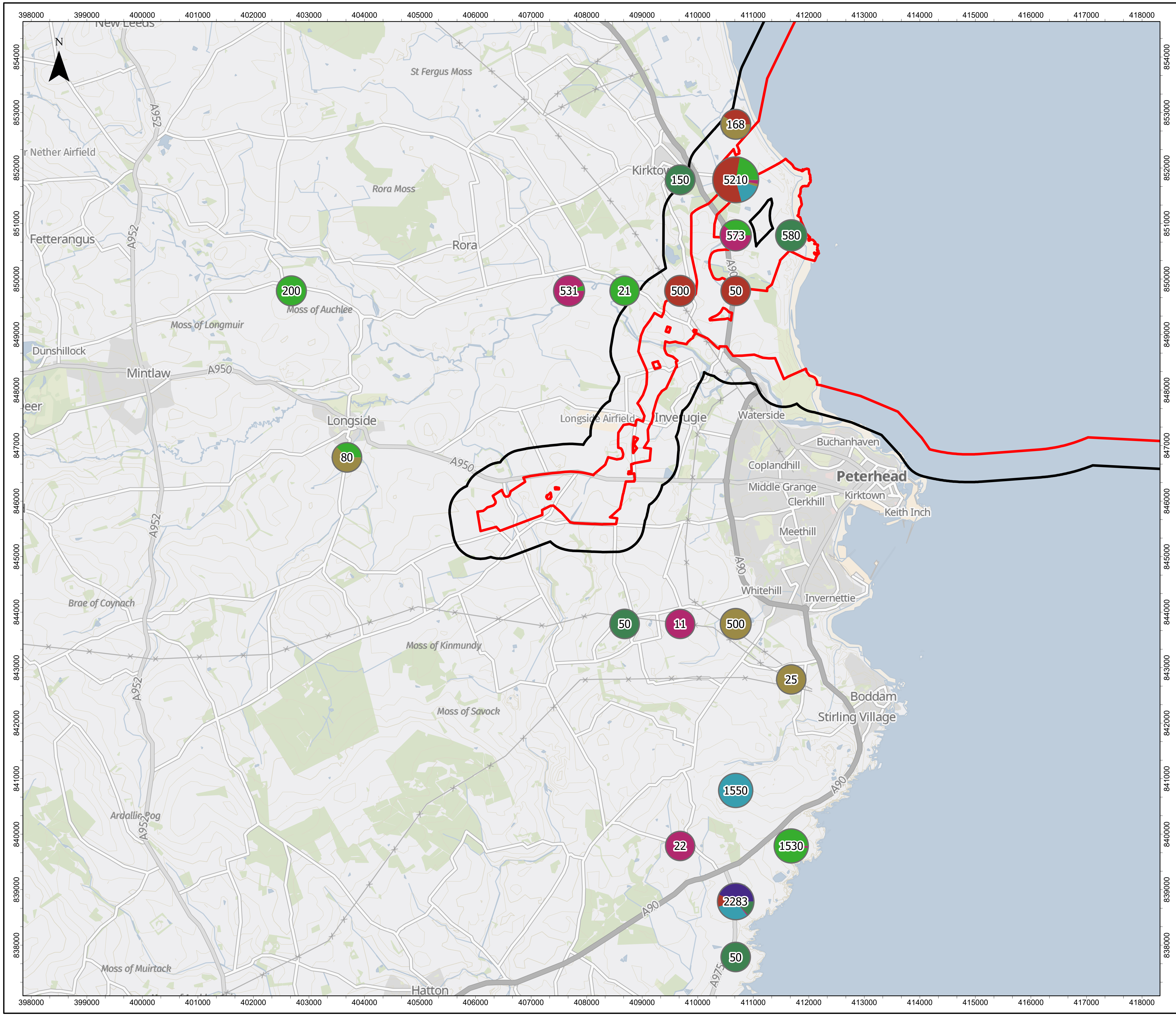


Red Line Boundary

500m buffer around the Red Line Boundary

Ramsar Site

Special Protection Area (SPA)

Pink-footed geese distribution (2023-2024)

September

October

November

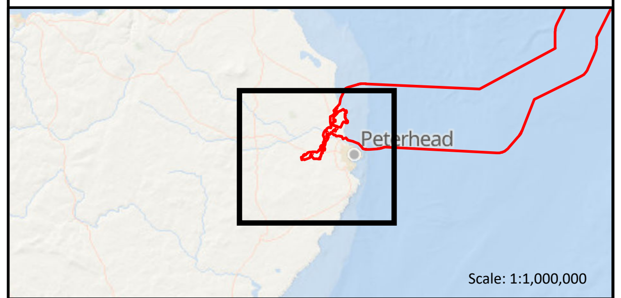
December

January

February

March

0 1,000 2,000 3,000 Metres



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PROJECT TITLE
MarramWind Offshore Wind Farm

DRAWING TITLE
Figure 5 Pink-footed geese distribution (2023-2024)

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4.3.5 Data limitations

4.3.5.1 While surveys were planned for days with acceptable weather, actual conditions during surveys were not always optimal. The distribution survey on 30 September 2022 had to be paused due to high wind and rain, with 1.6km of the transect not driven due to unsafe conditions. Additionally, the flight activity survey at Rattray on 10 November 2022 had to be stopped after 30 minutes, due to a combination of high winds (making it hard to hear geese calls) and declining visibility. Weather conditions and poor visibility also meant the Coralhill vantage point was not surveyed in September 2022 visit, and the Kirkhill vantage point was not surveyed during the November visit.

4.3.5.2 During the January 2023 visits, 0.7km of the transect was inaccessible due to flooding. A further 0.5km could not be surveyed due to a road closure north of Memsie.

4.3.5.3 The surveys on 4 October 2023 and 25 January 2024 occurred during moderate rain. The survey on 1 November 2023 was hampered by heavy rain, and the survey on 24 January 2024 occurred during winds measuring 6 on the Beaufort scale. Wind speeds also peaked between 6 and 7 on the Beaufort scale during the surveys on 23 November 2023, 27 and 29 February and 21 to 22 March 2024.

4.3.5.4 While these conditions reduced the amount of data available to inform the baseline, it is still considered that the data sets are fit for purpose. The extensive data set for 2022 / 2023 comprises 239 goose and swan records collected during 40 days of fieldwork over an eight-month period. The inaccessible lengths of road are a very small proportion of the entire 289km surveyed each month (less than 0.6%). Moreover, in almost all cases, a full survey was completed on other occasions without such limitations. For 2023 / 2024, the dataset comprises 72 goose, swan and wader observations collected during 23 days of fieldwork over a seven-month period. Importantly, no key survey period or key locations were missed. As such, it is considered that sufficient baseline data is available to allow a robust assessment of potential impacts.

5. Summary of Impacts

5.1 Overview

5.1.1.1 Within this Section the potential impact pathways for each stage of the Project considered for assessment are summarised, including any proposed mitigation measures. The specific protected sites and features screened in for assessment are outlined within the AA in **Section 6**. A summary of the screening conclusion can be found within the HRA Screening Report and stakeholder screening responses within **Table 3.1**.

5.2 Marine mammals

5.2.1 Summary of impacts

5.2.1.1 This Section summarises the potential impacts identified for the Project on marine mammals, specifically bottlenose dolphin, the qualifying feature of the Moray Firth SAC. It draws on the pathways for effect identified in the HRA Screening Report (see **Appendix A**), considering both embedded and, where relevant, additional mitigation measures.

5.2.1.2 The assessment in **Section 6.1** is structured by Project phase to provide clarity on how potential impacts may vary across construction, O&M, and decommissioning stages. Potential in-combination effects are considered separately in **Section 7.2**.

5.2.1.3 The bottlenose dolphin qualifying feature of the Moray Firth SAC was screened in for AA due to the potential for LSE from the following pathways (for specified stages):

- effects from UWN (construction, O&M; decommissioning) including;
  - direct effects (including death, physical injury, temporary reduction in hearing sensitivity);
  - disturbance or habitat displacement, including barrier effects;
- collision risk with vessels (construction, O&M, decommissioning);
- disturbance from vessel presence (construction, O&M, decommissioning);
- indirect impacts due to effects on prey (construction, O&M, decommissioning); and
- entanglement with mooring lines and / or secondary entanglement (for example, ‘ghost’ fishing gear; O&M only).

Impacts screened out

5.2.1.4 The impact pathways of direct habitat loss, barrier effects due to physical presence of offshore infrastructure, collision risk with WTG floating units, disturbance from EMFs from cables, and changes in water quality have been screened out for the bottlenose dolphin qualifying feature of the Moray Firth SAC (**Table 5.1**). Further detail on the embedded environmental measures referenced here is provided in **Appendix B**.

Table 5.1 Scoped out impact pathways for bottlenose dolphin feature of the Moray Firth SAC

Impact pathway	Justification
Direct habitat loss	No spatial overlap between Project area and Moray Firth SAC (90–150km separation). No habitats within the SAC will be directly or indirectly affected.
Barrier effects due to physical presence of offshore infrastructure	Moray Firth SAC has no spatial overlap with the Project OAA.
Collision risk with WTG floating units	Dolphins use echolocation and are capable of avoiding large stationary objects. No evidence of collision with wind farm structures.
Disturbance from EMF from cables	Cetaceans are not electroreceptive and cables will be buried.
Changes in water quality	Any release would be localised and temporary, managed through embedded pollution controls and contingency planning.

5.2.1.5 The Project OAA is located a substantial distance from the SAC (90–150km), with no spatial overlap with the SAC or functionally linked sea out with the SAC and throughout the CES MU (Cheney *et al.,* 2013; Arso Civil *et al*., 2019). The ZOI of the impact pathways relating to physical presence of offshore infrastructure, direct habitat loss and collision risk with WTG floating units, are restricted to the OAA; therefore, there is no spatial overlap with the SAC or functionally linked sea in the CES MU.

5.2.1.6 Bottlenose dolphins are known to be highly mobile and adaptable (Au, 1993; Richardson *et al.,* 1995); therefore, individuals from the CES MU may be present in the Project OAA, though this is not a core part of their range. Empirical evidence from fixed offshore wind developments indicate no displacement or restricted movements in response to turbine structures (Scheidat *et al*., 2011; Todd *et al*., 2016; Wisniewska *et al*., 2018). Concerns around WTG floating infrastructure are limited, though recent studies indicating low risk of barrier effects (Wawrzynkowski *et al*., 2025). At the time of writing this assessment, there have been no documented cases of collision with WTG floating infrastructure within monitoring programmes around existing wind farms (Scheidat *et al.,* 2011; Todd *et al.,* 2016).

5.2.1.7 Cetaceans are magneto-sensitive and use the Earth's magnetic field for navigation during migrations (Normandeau *et al*., 2011). Cetaceans are therefore capable of detecting electromagnetic variations caused by EMFs in close proximity; however, there is currently no evidence that cable-related EMF emissions directly affect marine mammals (Gill and Bartlett, 2010; Normandeau *et al.,* 2011; Copping, 2018). Further evidence of cetacean sensitivity to EMF is discussed in Section 11.10.2 within **Volume 1, Chapter 11: Marine Mammals** within the **EIA Report**. The risk of potential disturbance from EMF will be further minimised by cable burial in line with Department of Energy and Climate Change (DECC, 2011) guidance and embedded environmental measures (M-054; M-057). EMFs generated by subsea power cables are known to dimmish rapidly with distance, following an inverse square relationship both vertically and horizontally from the cable source. Typically, magnetic field strength falls to negligible levels within approximately 10m from the cable (Normandeau *et al.*, 2011). While shallow burial or external cable protection does not decrease the inherent strength of the EMF, it increases the distance between the cable and nearby receptors, effectively lowering their exposure.

5.2.1.8 Any deterioration of water quality from the re-suspension of contaminants from sediment, release of anti-fouling substances, and vessel- or WTG-related pollution including increased traffic, oil and fluid spill, and accidental collision (Bailey *et al.*, 2014; Maxwell *et al.*, 2022) may occur intermittently throughout the lifetime of the Project. The introduction of chemical pollution is likely to be short-lived and localised. Additionally, with the correct control measures adopted throughout the life cycle of the Project, the risk is further mitigated. Embedded environmental measures and contingency planning, such as a Marine Pollution Contingency Plan (M-033), Lighting and Marking Plan (VMNSP; M-038; including commitments to vessel management and best practice), Project Environmental Monitoring Programme (PEMP) (M-049) and Environmental Management Plan (M-122) will be implemented to provide additional safeguards (OSPAR, 2008).

5.2.1.9 Taking account of these factors, and supported by the best available scientific evidence, no LSE on the bottlenose dolphin qualifying feature of the Moray Firth SAC is concluded from these impact pathways. These impact pathways are therefore not taken forward for assessment.

5.2.2 Project parameters

5.2.2.1 The aim of this Section is to provide a summary of the key Project parameters and impacts assessed in the RIAA. A more detailed account of these parameters and impacts is presented in **Volume 1, Chapter 11: Marine Mammals** in the **EIA Report**.

Maximum design scenario

5.2.2.2 The RIAA applies a parameter-based design envelope approach, assessing a realistic worst-case scenario for potential impacts on marine mammals that are qualifying features of relevant National Site Network. This approach ensures that the conclusions of the HRA remain valid for any Project design that falls within the assessment parameters, allowing flexibility for future refinements which cannot be predicted at the time of submission of the planning application, marine licences consents and Section 36 (s.36) consent. By assessing the worst-case parameters for each impact and receptor, the RIAA identifies the maximum potential for an AEoSI. Any alternative design scenario, as described in the project description detailed in **Chapter 2**, would result in effects of no greater significance in HRA terms.

5.2.2.3 The specific maximum design scenario parameters relevant to marine mammal receptors are detailed in **Table 5.2**. These parameters represent the highest magnitude of activity with the potential to affect the COs of relevant National Site Network.

Table 5.2 Maximum design scenario for impacts on marine mammals

Activity / impact	Maximum design scenario parameter	Justification
Construction		
Auditory injury from increased UWN during installation of driven piles	Construction window of up to 12 years. **WTG anchor installation with driven piles:** • 8 driven pile anchors per floating unit, total 1,800 driven piles; • maximum pile length: 30m; • maximum pile diameter: 3m; • maximum hammer energy: 3,500kJ; • maximum number of driven piles per day per location is 2; • maximum number of concurrent piling locations is 2; • maximum hours of piling per driven pile is 2.35; and • maximum number of piling days is 1,800 (assuming one driven pile installed per day). **Offshore substation foundation installation with driven piles:** • 4 offshore substations with jacket foundations secured by driven piles; • 48 driven piles (12 per offshore substation); • maximum pile diameter: 3m; • maximum pile length: 95m; • maximum hammer energy: 3,500kJ; • maximum number of driven piles per day per location is 2; • maximum number of concurrent piling locations is 2; • maximum hours of piling per driven pile is 2.35; and • maximum number of piling days is 48 (assuming one pile installed per day.	Impulsive noise created during piling for the installation of the offshore substations and RCP foundations, and WTG anchors, has the potential to cause auditory injury (permanent threshold shift (PTS)) of marine mammals. PTS can reduce individual's ability to communicate, forage, and navigate. The scenario with the maximum number of piling days represents the temporal worst case; the scenario with the maximum predicted impact range for UWN represents the spatial worst case. The scenario with the maximum predicted impact range for underwater noise represents the spatial worst case.

Activity / impact	Maximum design scenario parameter	Justification
	RCP foundation installation with driven piles: • 2 RCPs with jacket foundation secured by driven piles; • 8 driven piles (4 per RCP); • maximum pile diameter: 3m; • maximum pile length: 95m; • maximum hammer energy: 3,500kJ; • maximum number of driven piles per day per location is 2; • maximum number of concurrent piling locations is 2; • maximum hours pilling per driven pile is 2.35; and • maximum number of piling days is 8 (assuming one pile installed per day). **Maximum number of piling days: 1,800 (WTG anchors) + 48 (offshore substations) + 8 (RCPs) = 1,856 days**.	
Auditory injury from unexploded ordnance (UXO) clearance	The type, size and number of possible UXO that might require clearance is currently unknown. The primary method of clearance will be low order, with high order being assessed as the worst-case scenario. An illustrative assessment is presented using charge weights (Trinitrotoluene equivalent) ranging from 25 kilograms (kg) to 750kg, with an additional donor weight of 0.5kg, for high order detonation. A charge weight of 0.25kg is used to provide an illustrative assessment of a low order (deflagration) detonation.	Detonation of UXO could result in direct trauma or auditory damage causing PTS. PTS can reduce individual's ability to communicate, forage, and navigate. UXO clearance will be licenced under a separate marine licence but is included in the **EIA Report** for illustrative purposes. The maximum UXO charge size and clearance method will determine the greatest noise impacts and the worst-case scenario.
Auditory injury from increased UWN during pre-construction surveys	**Indicative pre-construction geophysical survey equipment parameters may include:** • multibeam echo sounder (MBES); • side-scan sonar (SSS); • ultra-short baseline (USBL); • sub-bottom profiler (SBP); and	These types of geophysical surveys and duration represents the maximum potential for underwater noise from geophysical surveys which has the potential to cause auditory injury (PTS) of marine mammals. PTS can reduce

Activity / impact	Maximum design scenario parameter	Justification
	• ultra-high resolution seismic (UHRS) sparkers.	individual's ability to communicate, forage, and navigate.
Auditory injury from increased UWN during other construction activities	**Array cable installation**: • 225 array cables; • total array cable length of 680km; and • cable burial method of ploughing. **Offshore export cable installation:** • 5 offshore export cable trenches (these may include more than one cable per trench); • 140km offshore grid transmission route length per trench; and • cable burial method of ploughing.	Impulsive noise has a greater risk of causing marine mammals injury compared to non-impulsive noise; however, non-impulsive sound (as generated by these other construction activities) over a long period can cause PTS if the sound source is loud enough and within an individual's hearing sensitivity. The types of construction activity and duration of construction represents the maximum potential for UWN from other construction activities.
Disturbance from increased UWN during installation (for example, anchor piles)	Refer to auditory injury from increased UWN during installation, for example, anchor piles parameters.	Impulsive noise created during pile driving for installation of the offshore substations and RCP foundations, or WTG anchor, has the potential to cause disturbance or displacement of marine mammals. Disturbance can result in temporary displacement from breeding and foraging sites and can reduce individual's ability to communicate, forage, and navigate. The scenario with the maximum number of piling days represents the temporal worst case. The scenario with the maximum predicted impact range for UWN represents the spatial worst case.
Disturbance from UXO clearance	Refer to auditory injury from UXO clearance parameters.	Detonation of UXO could result in disturbance and behavioural change.

Activity / impact	Maximum design scenario parameter	Justification
		UXO clearance will be licenced under a separate marine licence but is included in the **EIA Report** for illustrative purposes. The maximum UXO charge size and clearance method will determine the greatest noise impacts and the worst-case scenario.
Disturbance from increased UWN during pre-construction surveys	Refer to auditory injury from increased UWN during pre-construction surveys parameters.	The type of geophysical surveys and duration represents the maximum potential for UWN from geophysical surveys which has the potential to cause disturbance of marine mammals. Disturbance can reduce individual's ability to communicate, forage, and navigate.
Disturbance from increased UWN from other construction activities	Refer to auditory injury from increased UWN during other construction activities parameters.	Non-impulsive sound has the potential to disturb or inhibit an individual's ability to communicate if the noise is above the ambient soundscape. The type of construction activity and duration of construction represents the maximum potential for UWN from other construction activities.
Vessel collisions from increased vessel presence and traffic	See worst case assessment scenario for the Shipping and Navigation assessment in **Volume 1, Chapter 15: Shipping and Navigation** of the **EIA Report**. Up to 10 vessels would be onsite at any one time. It is estimated that approximately 3,838 individual vessels trips would be required over the 12-year construction stage.	Vessel collision with marine mammals can result in injury or death. The maximum number of vessels and associated vessel movements represents the maximum potential for collision risk.
Disturbance from increased vessel presence and traffic	Refer to vessel collisions from increased vessel presence and traffic (construction) parameters.	Local disturbance from vessel presence and increased noise can influence surface

Activity / impact	**Maximum design scenario parameter**	**Justification**
		behaviour, induce avoidance behaviour, and disrupt foraging. The maximum number of vessels and associated vessel movements represents the maximum potential for disturbance.
Indirect effects on marine mammals via changes in prey availability	See worst case assessment scenario for the benthic, epibenthic and intertidal ecology assessment **(Volume 1, Chapter 10: Benthic, Epibenthic and Intertidal Ecology** of the **EIA Report**) and for the fish ecology assessment (**Volume 1, Chapter 13: Fish Ecology** of the **EIA Report**).	Potential change to prey availability and distribution due to increased noise could negatively affect foraging of marine mammals.
Operation and maintenance		
Increased UWN for example, operational noise and mooring noise	**WTGs:** • up to 225 WTGS; • 1,800 moorings lines in total (8 mooring lines per WTG); • 800m radius per individually moored floating unit (maximum mooring footprint of 2,010,619.298m^2 or 2.011km^2; and • mooring line material of rope, links, chain buoyancy and / or clump weights. The operational lifetime of the Project is 35 year per phase.	The design, number and capacity of the WTGs, and the design, dimensions and maximum spatial extent of the mooring lines, will lead to the maximum underwater noise that represents the worst-case scenario for noise-related impacts. There are no reliable noise thresholds that would be recommended to identify disturbance for rare / intermittent impulses of this type. Mooring lines associated with floating WTGs have been described as producing a ‘snapping’ noise related to tension release. As any snapping occurs at an average rate of less than one snap per hour, disturbance leading to avoidance behaviour is considered unlikely. The semi-submersible floating unit are the worst-case scenario in this instance as it is not a taut system.

Activity / impact	Maximum design scenario parameter	Justification
Vessel collisions from increased vessel presence and traffic	See worst case assessment scenario for the Shipping and Navigation assessment in **Volume 1, Chapter 15: Shipping and Navigation** of the **EIA Report**. Peak of up to seven O&M vessels offshore with up to 364 round trips to port per year.	The maximum number of vessels and associated vessel movements represents the maximum potential for collision risk.
Disturbance from increased vessel presence and traffic	Refer to vessel collisions from increased vessel presence and traffic (O&M) parameters.	The maximum number of vessels and associated vessel movements represents the maximum potential for disturbance.
Indirect impacts on marine mammals via changes in prey availability	See worst case assessment scenario for the benthic, epibenthic and intertidal ecology assessment (**Volume 1, Chapter 10: Benthic, Epibenthic and Intertidal Ecology** of the **EIA Report**) and for the fish and shellfish ecology (**Volume 1, Chapter 13: Fish Ecology** of the **EIA Report**).	Potential change to prey availability and distribution could negatively affect foraging of marine mammals.
Entanglement in lines and cables for example, mooring lines and array cables	**Mooring lines:** • 1,800 moorings lines in total (8 mooring lines per WTG); • 800m radius per individually moored floating unit (maximum mooring footprint of 2,010,619.298m^2 or 2.011km^2; • catenary mooring line; and • mooring line material of rope, links, chain buoyancy and / or clump weights. **Array cables:** • up to 225 array cables • 136km of unburied array cable (assuming a worst case of 20% of cable length cannot be buried). The presence of the moorings and dynamic cables will be restricted to the array area only. The operational lifetime of the Project is 35 years per phase.	The design, dimensions and maximum spatial extent of the mooring lines and array cables represent the maximum potential for entanglement.

Activity / impact	Maximum design scenario parameter	Justification
Decommissioning		
Auditory injury from increased UWN	The maximum design scenario will be equal to (or less than) that of the construction stage.	
Disturbance from decommissioning activities		
Vessel collisions from increased vessel presence and traffic		
Disturbance from increased vessel presence and traffic		
Indirect effects on marine mammals via changes in prey availability		

5.2.3 Project commitments

5.2.3.1 A number of embedded environmental measures have been incorporated into the Project design to avoid or reduce potential adverse effects on marine mammal qualifying features and to support the achievement of relevant COs as seen within **Table 5.3** (**Section 5.2.4** construction stage), **Table 5.4** (**Section 5.2.5** O&M stage) and **Table 5.5** (**Section 5.2.6** decommissioning stage).

5.2.3.2 The relevant embedded environmental measures within the design and their relevance to the marine mammal assessment are detailed **Appendix B**. Further detail on the embedded environmental measures is provided in **Appendix B**, which identifies the scope of each measure, how and where it will be applied, and the securing mechanisms.

5.2.4 Construction stage

5.2.4.1 Construction activities associated with the Project with the potential to result in effects on the bottlenose dolphin qualifying feature of the Moray Firth SAC are assessed under the maximum design scenario, as outlined in **Table 5.2** (see **Chapter 2** for full details).

5.2.4.2 Construction activities considered with potential to result in LSE include:

- impact piling of pin piles for the installation of offshore substations and RCPs foundations, and for WTG driven pile anchors (where all piling locations fall outwith the CES MU);
- UXO clearance prior to construction works;
- pre-construction activities:
  - geophysical and geotechnical site investigation surveys of the Project OAA and offshore export cable corridor;
- other construction activities including:
  - seabed preparation activities (for example, boulder removal and sandwave clearance) to clear and stabilise the seabed in advance of construction activities;
  - dredging and rock dumping for offshore cable route;
  - drilling for substation anchor foundation installation;
  - seabed disturbance from cable trenching, jetting and mechanical cutting;
- vessel movements associated with construction; and
- all activities with the potential to cause changes to prey.

5.2.4.3 Construction is anticipated to occur across three phases over a period of up to 12 years, commencing from 2030 (see **Section 2.9**).

5.2.4.4 The maximum design scenario assumes up to 1,856 piling days and extensive seabed disturbance from cable trenching and rock dumping. UXO clearance, while subject to separate licencing, is included in this assessment due to its potential to generate impulsive noise surrounding the Project.

5.2.4.5 These activities are assessed in relation to the following impact pathways:

- UWN (auditory injury, disturbance, and barrier effects);
- collision risk with vessels;

- disturbance from vessel presence; and
- indirect impacts on prey species.

5.2.4.6 **Table 5.3** summarises the construction stage impacts on the bottlenose dolphin feature of the Moray Firth SAC, including relevant embedded environmental measures and additional mitigation.

Table 5.3 Summary of construction impacts for marine mammals

Designated site	Qualifying feature(s)	Impacts	Embedded environmental measures	Additional mitigation
Moray Firth SAC	Bottlenose dolphin	UWN (auditory injury).	M-032 M-105 M-114 M-115 M-121	No additional mitigation is required.
		UWN (disturbance and displacement).	M-032 M-105 M-121	No additional mitigation is required.
		Collision risk with vessels.	M-039	Adherence to Scottish Marine Wildlife Watching Code (SMWWC); speed restrictions; designated transit routes.
		Vessel disturbance.	M-039	SMWWC; predictable vessel schedules; minimisation of unnecessary manoeuvring
		Indirect effects to prey species.	M-028 M-048 M-049 See **Volume 1, Chapter 10: Benthic,**	No additional mitigation is required.

Designated site	Qualifying feature(s)	Impacts	Embedded environmental measures	Additional mitigation
			Epibenthic and Intertidal Ecology and **Volume 1, Chapter 13: Fish Ecology** of the **EIA Report**.	

5.2.5 Operation and maintenance stage

5.2.5.1 The O&M stage of the Project includes ongoing activities such as routine vessel operations, inspection and maintenance of offshore infrastructure, and potential cable repair or replacement. These activities are assessed using the maximum design scenario, as outlined in **Table 5.2** (see **Chapter 2** for full details).

5.2.5.2 Although less intensive than construction, certain O&M activities were considered to have the potential to result in LSE on the bottlenose dolphin qualifying feature of the Moray Firth SAC. These include:

- operational WTG floating units, mooring lines, array cables and export cables;
- vessels movements associated with O&M; and
- all activities with the potential to cause changes to prey.

5.2.5.3 The operational lifetime of the Project is anticipated to be 35 years per phase (see **Section 2.10**).

5.2.5.4 These O&M activities are assessed in relation to the following impact pathways:

- UWN (auditory injury and disturbance);
- collision risk with vessels;
- disturbance from vessel presence;
- entanglement risk associated with lines or cables and potential secondary entanglement (for example, ghost fishing gear); and
- indirect impacts on prey species.

5.2.5.5 **Table 5.4** summarises the potential impacts during the O&M stage on the bottlenose dolphin feature of the Moray Firth SAC, including relevant embedded environmental measures and additional mitigation.

Table 5.4 Summary of operation and maintenance impacts for marine mammals

Designated site	Qualifying feature(s)	Impacts	Embedded environmental measures	Additional mitigation
Moray Firth SAC	Bottlenose dolphin	UWN (operational noise from WTGs and cables).	M-054 M-057 M-122	Monitoring as required under PEMP (M-049, if retained).
		Collision risk with vessels.	M-039 M-122	Adherence to SMWWC.
		Vessel disturbance.	M-039 M-122	SMWWC
		Indirect effects to prey availability.	M-028 M-048 M-049 M-122 See **Volume 1, Chapter 10: Benthic, Epibenthic and Intertidal Ecology**, and **Volume 1, Chapter 13: Fish Ecology** of the **EIA Report**.	See **Volume 1, Chapter 10: Benthic, Epibenthic and Intertidal Ecology** and **Volume 1, Chapter 13: Fish Ecology** of the **EIA Report**.
		Entanglement and / or secondary entanglement.	M-054 M-057 M-122	Regular inspection and maintenance of moorings and cables to reduce debris; reporting to relevant authorities.

5.2.6 Decommissioning stage

5.2.6.1 The decommissioning stage of the Project will involve the removal or safe abandonment of offshore infrastructure including WTGs, offshore substations and RCP foundations, cables, and anchors. These activities are assessed using the maximum design scenario, as outlined in **Table 5.2** (see **Chapter 2** for full details).

5.2.6.2 Decommissioning is expected to occur after 35 years of the first O&M stage has been completed, decommissioning may occur over different years reflective of the three proposed construction stages. The nature and scale of decommissioning activities are anticipated to be comparable to, or less than, those of the construction stage. Therefore, potential effects on the bottlenose dolphin qualifying features of the Moray Firth SAC are assessed jointly with the construction stage.

5.2.6.3 Furthermore, decommissioning activities will be subject to separate licencing and regulatory controls, which will include appropriate environmental safeguards and environmental measures to prevent adverse effects onsite integrity.

5.2.6.4 The following impact pathways are assessed for decommissioning activities:

- UWN (auditory injury, disturbance and displacement, and barrier effects);
- collision risks with vessels;
- disturbance from vessel presence; and
- indirect impacts on prey species.

5.2.6.5 **Table 5.5** summarises the potential impacts during the decommissioning stage, including embedded environmental measures and additional mitigation. Further detail on the embedded environmental measures is provided in **Appendix B**, which identifies the scope of each measure, how and where it will be applied, and the securing mechanisms.

Table 5.5 Summary of decommissioning impacts for marine mammals

Designated site	Qualifying feature(s)	Impacts	Embedded Environmental measures	Additional mitigation
Moray Firth SAC	Bottlenose dolphin	UWN (auditory injury).	M-106	Adherence to latest guidance available at the time.
		UWN (disturbance and displacement).	M-106	Adherence to latest guidance available at the time.
		Collision risk with vessels.	M-039 M-106	Adherence to latest guidance available at the time.
		Vessel disturbance.	M-039 M-106	Adherence to latest guidance available at the time.
		Indirect impacts on prey species.	M-049 M-106 See **Volume 1, Chapter 10: Benthic, Epibenthic and Intertidal Ecology**, and **Volume 1, Chapter 13: Fish Ecology** of the **EIA Report**.	See **Volume 1, Chapter 10: Benthic, Epibenthic and Intertidal Ecology** and **Volume 1, Chapter 13: Fish Ecology** of the **EIA Report**.

5.3 Offshore and intertidal ornithology

5.3.1 Summary of impacts

5.3.1.1 This Section summarises the potential impacts identified for the Project on offshore ornithology. It draws on the effect pathways identified in the HRA Screening Report (see **Table 3.1**), considering both embedded and where relevant, additional mitigation measures.

5.3.1.2 The assessment in **Section 6.2** and **Section 6.3** for offshore and intertidal ornithology, respectively, is structured by Project phase to provide clarity on how potential impacts may vary across construction, O&M, and decommissioning stages. Potential in-combination effects are considered separately in **Section 7.3** and **Section 7.4**.

5.3.1.3 Offshore ornithology qualifying features of various SPAs / Ramsars were screened in for AA due to the potential for LSE from the following pathways (for specified stages):

- direct temporary habitat loss (offshore export cable corridor) (construction and decommissioning);
- light pollution (OAA) (construction, O&M and decommissioning);
- distributional responses (OAA) (O&M);
- collision risk (OAA) (O&M); and
- entanglement with mooring lines (OAA) (O&M).

5.3.1.4 Intertidal ornithology qualifying features of Buchan Ness to Collieston Coast and Ythan Estuary, Sands of Forvie and Meikle Loch SPAs were screened in for AA due to the potential for LSE from the following pathways (for specified stages):

- direct temporary disturbance and displacement (offshore export cable corridor and landfall) (construction and decommissioning).

Impacts screened out

5.3.1.5 A number of potential effects have been scoped out from further assessment, resulting from a conclusion of no LSE. These conclusions have been made based on the knowledge of the baseline environment, the nature of planned works and the professional judgement on the potential for impact from such projects more widely. The conclusions follow (in a site-based context) existing best practice. Each scoped out activity or impact is outlined below and is considered in further detail within Table 12.3 of **Volume 1, Chapter 12: Offshore and Intertidal Ornithology** of the **EIA Report**, with the scoping out of these impacts agreed appropriate during Scoping Opinion (see Table 12.1 of **Volume 1, Chapter 12: Offshore and Intertidal Ornithology** of the **EIA Report**):

- accidental pollution during all Project stages (including indirect effects); and
- operational disturbance and displacement (offshore export cable corridor).

5.3.2 Project parameters

5.3.2.1 A summary of the key Project parameters is presented below. A more detailed account of these parameters is presented in Section 12.7 of **Volume 1 Chapter 12 Offshore and Intertidal Ornithology** of the **EIA Report**.

Maximum design scenario

5.3.2.2 The process of assessing using a parameter-based design envelope approach means that the assessment considers a maximum design scenario whilst allowing the flexibility to make improvements in the future in ways that cannot be predicted at the time of submission of the planning application, marine licences applications and s.36 consent.

5.3.2.3 The assessment of the maximum adverse scenario for each receptor establishes the maximum potential adverse effect and as a result effects of greater adverse significance would not arise should any other scenario (as described in **Chapter 2**) to that assessed within this Section be taken forward in the final Project design.

5.3.2.4 The maximum design scenario parameters that have been identified to be relevant to offshore and intertidal ornithology are outlined in **Table 5.6** and are in line with the project design envelope (**Chapter 2**).

Table 5.6 Maximum design scenario for impacts on offshore and intertidal ornithology

Impact / activity	Maximum design scenario parameter	Justification
Construction		
Direct temporary habitat loss / disturbance (OAA and offshore export cable corridor)	**Vessels:** See worst case assessment scenario for the shipping and navigation assessment in **Chapter 15: Shipping and Navigation**. Vessel type: • heavy lift vessel: 1 vessel, 12 round trips; • support vessel: 5 vessels, 90 round trips; • barge (if required): 1 vessel, 12 round trips; • Anchor Handling Tug Supply (AHTS) vessel: 14 vessels, 2,595 round trips; • survey vessel: 1 vessel, 20 round trips; • offshore construction vessel or larger AHTS vessel: 6 vessels, 859 round trips; • rock placement vessel: 4 vessels, 110 round trips. Up to 10 vessels would be onsite at any one time. It is estimated that approximately 3,838 individual vessels trips would be required over the 12-year construction stage. **OAA:** • deployment of wind turbines and other offshore infrastructure across the full OAA (684km^2). **Wind turbine generators (WTGs): 6.75km^2** • up to 225 WTGs; • mooring concepts: catenary;	This is the maximum area of temporary disturbance required for the installation within the OAA. This represents the maximum area that will be occupied both above and below the sea surface, that therefore influences habitat availability in the air, on the sea surface, and in the water column (relevant for diving birds).

Impact / activity	Maximum design scenario parameter	Justification
	• maximum seabed displacement: Anchor type: drag embedment[2] fully buried (breadth 12.5m). 300m drag length. Seabed impact of 3,750m^2 per anchor; and • total anchor disturbance (assuming 225 WTGs, each with 8 anchors) is 6.75km^2. **Array cables: 20.4km^2** • 225 array cables; • 680km total array cable length; • assumed jet trenching installation method as worst-case for sediment mobilisation with 30m disturbance width; • temporary construction disturbance assumed 100% of total array cable length is buried by jet trenching; 680km x 0.03km = 20.4km^2 **SDCs: 125,280m^2** • up to 45 SDCs; • assumed worst-case is gravity base foundations; • SDC construction footprint: 58m x 48m, footprint is 2,784m^2 per SDC; and • total disturbance is 125,280m^2 for 45 SDCs. **Offshore substations: 57,200m^2** • 4 offshore substations with jacket foundations secured with suction caisson; • offshore substation construction footprint: 130m x 110m = 14,300m^2 per offshore substations; and • total disturbance is 57,200m^2 for four offshore substations; **Offshore export cables: 21km^2** • 5 offshore export cable trenches; • 140km offshore grid transmission route length per trench;	

[2] Should the drag embedment end point be out of tolerance then it would be required to lift the anchor and re-lay increasing the seabed displacement by the same amount. At the design stage, it is not possible to accurately determine the level of installation failure or damage when laying the anchors. There will remain a residual risk that some anchors may need to be re-laid as they are out of tolerance or moved during service. This will depend on seabed conditions and other factors associated with offshore operations of the install vessels.

Impact / activity	Maximum design scenario parameter	Justification
	• assumed jet trenching installation method as worst-case for sediment mobilisation with 30m disturbance width, • temporary construction disturbance assumed 100% of total export cable length is buried by jet trenching of 140km x 0.03km = 4.2km^2 per cable; and • total disturbance is 21km^2 for five cables. **Cable crossings: 714,000m^2** • 6 cable crossings per trench within the OAA with construction footprint of 170m x 30m = 5,100m^2, total of 153,000m^2 for 6 cable crossings for 5 cable trenches; and • 22 cable crossings along the offshore export cable corridor with construction footprint of 170m x 30m = 5,100m^2, total of 561,000m^2 for 22 cable crossings for 5 cable trenches. **RCPs: 14,450m^2** • 2 RCPs with jacket foundations secured with suction caisson; construction footprint: 85m x 85m = 7,225m^2 (per RCP); and • total disturbance is 14,450m^2 for 2 RCP's.	
Direct temporary habitat loss / disturbance (offshore export cable corridor landfall)	**Landfall** • Scotstown, Lunderton North and Lunderton South; • 8 HDD ducts; HDD exit pit dimensions: assumed 5m x 2m as worst-case, 10m^2 per exit pit; and • total disturbance is 80m^2 for 8 exit pits. Landfall construction works duration: • Phase 1 – up to one year; • Phase 2 – up to one year; and • Phase 3 – up to one year.	This is the maximum area of temporary disturbance required for the installation along the export cable corridor. For construction activities associated with the offshore export cable corridor, the assumption is that vessels would be *in situ* from start to finish so any disturbance events would be throughout the entire period.

Impact / activity	Maximum design scenario parameter	Justification
Indirect impacts due to effects on prey species and habitats (OAA and offshore export cable corridor)	See worst case assessment scenario for the benthic, epibenthic and intertidal ecology and shellfish assessment (Impacts C1 and C3) in **Chapter 10: Benthic, Epibenthic and Intertidal Ecology** and for the fish ecology assessment (Impacts C2 to C8) in **Chapter 13: Fish Ecology.**	
Operation and maintenance		
Indirect impacts due to effects on prey species and habitats (OAA)	See worst case assessment scenario for the benthic, epibenthic and intertidal ecology and shellfish assessment (Impacts O1 to O7) in **Chapter 10: Benthic, Epibenthic and Intertidal Ecology** and for the fish ecology (Impacts O1 to O11) in **Chapter 13: Fish Ecology**.	
Distributional responses (OAA)	**WTG** • Up to 225 WTGs (based on 14MW). **Vessels** See worst case assessment scenario for the Shipping and Navigation assessment in **Volume 1, Chapter 15: Shipping and Navigation of the EIA Report**. Peak of up to 7 O&M vessels offshore with up to 364 round trips to port per year. **OAA** • deployment of wind turbines and other offshore infrastructure across the full OAA (684km^2).	The maximum Project footprint and the maximum extent of equipment needed so is considered to be the maximum design scenario for distributional response effects. Distributional responses would be assumed from the entire OAA that contains wind turbines and other associated structures, which maximises the potential for distributional responses. For operational and maintenance activities associated with upkeep and repair, the assumption is that vessels would be *in situ* from start to finish of such activities but that these would be limited in spatial extent and short lived. Any disturbance events would be temporary and from the limited

Impact / activity	Maximum design scenario parameter	Justification
		spatial area at which repairs, or maintenance occurred.
Collision risk (OAA)	**WTG** • up to 225 WTGs (based on 14MW); and • air gap of 22m (MHWS).	Within **Volume 3, Appendix 12.3** two different turbine designs were modelled. The turbine design that produced the highest predicted mortality due to collisions has been concluded as the maximum design scenario taken forward and assessed within the **EIA Report**.
Entanglement with mooring lines (OAA)	• eight mooring lines per WTG floating unit equalling a total of 1,800 mooring lines.	The maximum mooring lines required so is considered to maximum-design scenario for assessment
Decommissioning		
Direct temporary habitat loss / disturbance (OAA)	See worst case assessment scenario for the benthic, epibenthic and intertidal ecology and shellfish assessment (Impacts D1 to D5) in **Chapter 10: Benthic, Epibenthic and Intertidal Ecology** and for fish and shellfish ecology assessment (Impacts D1 to D70) in **Chapter 13: Fish Ecology**.	
Direct temporary habitat loss / disturbance (offshore export cable corridor)	See worst case assessment scenario for the benthic, epibenthic and intertidal ecology and shellfish assessment (Impacts D1 to D5) in **Chapter 10: Benthic, Epibenthic and Intertidal Ecology** and for fish and shellfish ecology assessment (Impacts D1 to D70) in **Chapter 13: Fish Ecology**.	

5.3.3 Project commitments

5.3.3.1 A number of embedded environmental measures have been incorporated into the Project design to avoid or reduce potential adverse effects on offshore and intertidal ornithology qualifying features and to support the achievement of relevant conservation objectives as seen within **Table 5.7** and **Table 5.8** (**Section 5.4.3** Construction stage), **Table 5.9** (**Section 5.3.5** O&M stage) and **Table 5.10** and **Table 5.11** (**Section 5.3.6** Decommissioning stage).

5.3.3.2 The relevant embedded environmental measures within the design and their relevance to the offshore and intertidal ornithology assessment are detailed **Appendix B**. Further detail on the embedded environmental measures is provided in **Appendix B**, which identifies the scope of each measure, how and where it will be applied, and the securing mechanisms.

5.3.4 Construction stage

Offshore ornithology

5.3.4.1 Based on the designated sites, features and effect pathways presented within **Table 3.1**, and accounting for any amendments required to screening conclusions following feedback received in **Section 3.6**, the effect pathways requiring assessment during the construction stage are provided in **Table 5.7**.

Table 5.7 Summary of construction impacts for offshore ornithology

Designated site	Qualifying feature(s)	Impacts	Embedded environmental measures
Buchan Ness to Collieston Coast SPA	Kittiwake, herring gull, guillemot, fulmar, shag and seabird assemblage qualifying features.	Direct temporary habitat loss (offshore export cable corridor). Construction activities such as increased vessel activity and above and underwater noise may result in temporary direct disturbance or displacement of birds.	None applicable.
Various SPAs, see Table 3.1	Storm petrel, Leach's storm petrel and Manx shearwater qualifying features.	Light pollution (OAA). Light pollution associated with construction works within the OAA, may cause disorientation or attraction to photosensitive to seabirds, particularly at night.	M-038

Intertidal ornithology

5.3.4.2 Based on the designated sites, features and effect pathways presented within **Table 3.1**, and accounting for any amendments required to screening conclusions following feedback received in **Section 3.6**, the effect pathways requiring assessment during the construction stage are provided in **Table 5.8**.

Table 5.8 Summary of construction impacts for intertidal ornithology

Designated site	Qualifying feature(s)	Impacts	Embedded environmental measures
Buchan Ness to Collieston Coast SPA	Guillemot, shag and seabird assemblage qualifying features.	Direct temporary disturbance and displacement (offshore export cable corridor and landfall). Construction activities such as increased vessel activity and above and underwater noise may result in temporary direct disturbance or displacement of birds.	M-120 M-121
Ythan Estuary, Sands of Forvie and Meikle Loch SPA	Eider and waterbird assemblage qualifying features.	Direct temporary disturbance and displacement (offshore export cable corridor and landfall). Construction activities such as increased vessel activity and above and underwater noise may result in temporary direct disturbance or displacement of birds.	M-120 M-121

5.3.5 Operation and maintenance stage

Offshore ornithology

5.3.5.1 Based on the designated sites, features and effect pathways presented within **Table 3.1,** and accounting for any amendments required to screening conclusions following feedback received in **Section 3.6**, the effect pathways requiring assessment during the O&M stage are provided in **Table 5.9**.

Table 5.9 Summary of operational impacts for offshore ornithology

Designated site	Qualifying feature(s)	Impacts	Embedded environmental measures
Various SPAs, see Appendix A	Storm petrel, Leach's storm petrel and Manx shearwater qualifying features.	Light pollution (OAA). Light pollution associated with required navigational lighting within the OAA at night, may cause disorientation or attraction to photosensitive seabirds.	M-038
Various SPAs, see Appendix A	Kittiwake, guillemot, razorbill, puffin, fulmar, gannet Storm petrel, Leach's storm petrel and Manx shearwater qualifying features.	Distributional responses (OAA). The presence of WTGs has the potential to disturb and displace birds from within and around the Project area. Additionally, the presence of WTGs may lead to barrier effects for bids whilst undertaking migratory, foraging or commuting flights	None applicable.
Various SPAs, see Appendix A	Great black-backed gull, great skua, kittiwake and gannet qualifying features.	Collision risk (OAA). There is a risk of birds in flight colliding with rotating WTG blades.	M-043
Various SPAs, see Appendix A	Guillemot, razorbill, puffin and gannet qualifying features.	Entanglement with mooring lines (OAA). Derelict / lost fishing gear could entangle in mooring lines with the potential for diving seabirds to become entangled.	None applicable.

Intertidal ornithology

5.3.5.2 No effect pathways were identified for assessment of intertidal ornithology during the O&M stage. This is because during O&M stage the export cable will be fully installed and subterranean, with only the potential for infrequent ad-hoc maintenance.

5.3.6 Decommissioning stage

Offshore ornithology

5.3.6.1 Based on the designated sites, features and effect pathways presented within **Table 3.1**, and accounting for any amendments required to screening conclusions following feedback received in **Section 3.6**, the effect pathways requiring assessment during the decommissioning stage are provided in **Table 5.10**.

Table 5.10 Summary of decommissioning impacts for offshore ornithology

Designated site	Qualifying feature(s)	Impacts	Embedded environmental measures
Buchan Ness to Collieston Coast SPA	Kittiwake, herring gull, guillemot, fulmar, shag and seabird assemblage qualifying features.	Direct temporary habitat loss (offshore export cable corridor). Decommissioning activities such as increased vessel activity and above and underwater noise may result in temporary direct disturbance or displacement of birds.	None applicable.
Various SPAs, see Appendix A	Storm petrel, Leach's storm petrel and Manx shearwater qualifying features.	Light pollution (OAA). Light pollution associated with decommissioning works within the OAA, may cause disorientation or attraction to photosensitive to seabirds, particularly at night.	M-038

Intertidal ornithology

5.3.6.2 Based on the designated sites, features and effect pathways presented within **Table 3.1**, and accounting for any amendments required to screening conclusions following feedback received in **Section 3.6**, the effect pathways requiring assessment during the decommissioning stage are provided in **Table 5.11**.

Table 5.11 Summary of decommissioning impacts for intertidal ornithology

Designated site	Qualifying feature(s)	Impacts	Embedded environmental measures
Buchan Ness to Collieston Coast SPA	Guillemot, shag and seabird assemblage qualifying features	Direct temporary disturbance and displacement (offshore export cable corridor and landfall). Decommissioning activities such as increased vessel activity and above and underwater noise may result in temporary direct disturbance or displacement of birds.	M-120 M-121
Ythan Estuary, Sands of Forvie and Meikle Loch SPA	Eider and waterbird assemblage qualifying features.	Direct temporary disturbance and displacement (offshore export cable corridor and landfall). Decommissioning activities such as increased vessel activity and above and underwater noise may result in temporary direct disturbance or displacement of birds.	M-120 M-121

5.4 Terrestrial ecology and ornithology

5.4.1 Summary of impacts

5.4.1.1 This Section summarises the potential impacts identified for the Project on pink-footed geese, a qualifying feature of the Loch of Strathbeg SPA / Ramsar. It draws on the pathways for effect identified in the HRA Screening Report (see **Table 3.1**), considering embedded environmental measures.

5.4.1.2 The assessment in **Section 6.4** is structured by Project stage to provide clarity on how potential impacts may vary across construction, O&M, and decommissioning stages. Potential in-combination effects are considered separately in **Section 7.5**.

5.4.1.3 The pink-footed goose qualifying feature of the Loch of Strathbeg SPA / Ramsar was screened in for AA due to the potential for LSE from the following impact pathways (for specified stages):

- land take / land cover change (construction, O&M, decommissioning); and
- increased human presence, noise and vibration, and increased light levels (construction, O&M, decommissioning); and
- in combination effects (construction, O&M and decommissioning).

5.4.2 Project parameters

5.4.2.1 The aim of this Section is to provide a summary of the key Project parameters and impacts assessed in the RIAA. A more detailed account of these parameters and impacts is presented in **Volume 1, Chapter 23: Terrestrial Ecology and Ornithology** in the **EIA Report**.

Maximum design scenario

5.4.2.2 The RIAA applies a parameter-based design envelope approach, assessing a realistic worst-case scenario for potential impacts on pink-footed geese. This approach ensures that the conclusions of the HRA remain valid for any Project design that falls within the assessment parameters, allowing flexibility for future refinements which cannot be predicted at the time of submission of the planning application, marine licences applications and s.36 consent. By assessing the maximum design scenario parameters for each impact and receptor, the RIAA identifies the maximum potential for an AEoSI. Any alternative design scenario, as described in **Chapter 2**, would result in effects of no greater significance in HRA terms.

5.4.2.3 The specific maximum design scenario parameters which represent the highest magnitude of activity with the potential to affect the COs of the Loch of Strathbeg SPA / Ramsar relevant to wintering pink-footed geese population are detailed in **Table 5.12** The parameters associated with the three impact pathways are summarised:

- With respect to ‘Land take / land cover change – functionally linked non-designated habitat supporting pink-footed geese, associated with Loch of Strathbeg SPA / Ramsar’, the maximum design scenario assumes that development may take place anywhere within the Onshore Red Line Boundary.
- With respect to ‘Increased human presence, noise and vibration - functionally linked non-designated habitat, supporting pink-footed geese, associated with Loch of Strathbeg SPA / Ramsar’ the maximum design scenario assumes that development

may take place anywhere within the Onshore Red Line Boundary. Additionally direct effects on qualifying features of the SPA / Ramsar are considered within non-designated functionally linked land within a 500m disturbance buffer of the Onshore Red Line Boundary (See **Figure 6**), based on disturbance buffers from Goodship and Furness (2022).

- It is generally considered that pink-footed geese have a core foraging range of up to 20km from their roost sites (in this case the Loch of Strathbeg), therefore a 20km buffer has been applied around the Loch of Strathbeg (See **Figure 6**) within which all proposed developments will be considered in relation to the combination effects assessment.

Table 5.12 Maximum design scenario for impacts on terrestrial ecology and ornithology

Activity / impact	Maximum design scenario parameter	Justification
Construction, O&M and decommissioning		
Impact 1: Land take / land cover change - Functionally-linked non-designated habitat supporting pink-footed geese, associated with Loch of Strathbeg SPA / Ramsar	**Construction:** <u>Landfall(s):</u> Assumes maximum footprint of construction activities for all landfall(s) (Scotstown and Lunderton North and South): • temporary access road/s up to 6m wide, location see **Volume 2, Figure 4.1: Onshore Red Line Boundary and indicative onshore infrastructure** of the **EIA Report**; • temporary construction compound area 345m x 70m; • up to seven below ground transition joint bays, typically 12m long x 3.5m wide x 2.5m deep; • up to eight cable ducts; and • cable ducts installed using HDD or similar trenchless techniques between landfall(s) and onshore substations. Landfall(s) construction works duration: • Phase 1 – up to one year; • Phase 2 – up to one year; and • Phase 3 – up to one year. <u>Onshore export cable corridor:</u> • temporary access roads / haul roads up to 6m wide, location see **Volume 2, Figure 4.1**; • for the onshore export cable corridor from the landfall(s) to the onshore substations, the corridor is	A maximum design scenario assumes that development may take place anywhere within the Onshore Red Line Boundary.

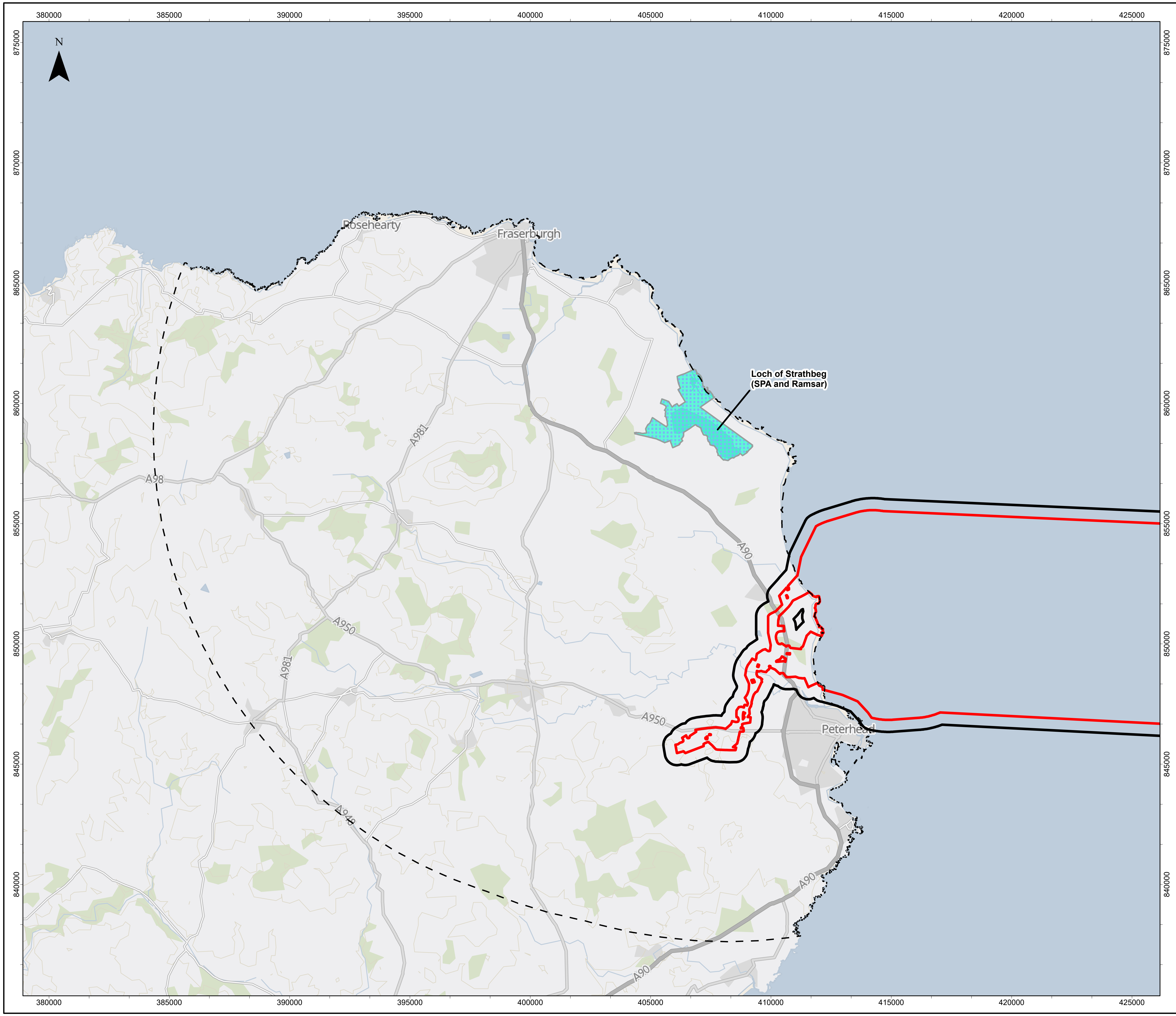
Activity / impact	Maximum design scenario parameter	Justification
	up to 89m wide and an approximate length of 11 km; • up to six trenches, with typical trench depth of up to 1.5m; • onshore export cable corridor from the onshore substations to the SSEN Netherton Hub, the corridor is up to 99m wide and an approximate length of 2.35km; and • up to seven trenches, with typical trench depth of up to 1.5m between the onshore substations to the grid. Transition Joint bays: • typically, joint bays are located every 600 to 1,000m; • at each joint bay location, along the onshore export cable corridor from the landfall(s) to the onshore substations, there are up to six joint bays; • at each joint bay location, along the onshore export cable corridor from the onshore substations to SSEN Netherton Hub, there are up to seven joint bays; • each joint bay will be approximately 9m long by 3m wide, with a depth of up to 2m; • Joint bay compounds will be approximately 30m x 85m for phases 2 and 3 • joint bay construction duration per location (does not include cable pulling duration) is six to ten weeks; • each joint bay will have an associated link box and FOC junction box that will be accessible at surface level; and	

Activity / impact	Maximum design scenario parameter	Justification
	- each link box and FOC junction box will be approximately 3m long by 1m wide, with a depth of up to 1.5m. The temporary construction corridor may require widening beyond the standard width to allow enough space for access / equipment at crossing points with roads, rivers or utilities, and to avoid other obstacles to installation. Trenchless crossings: - the onshore export cable corridor widens to up to 300m at locations where trenchless crossings are required; - twenty-two trenchless crossing compounds; - trenchless crossing compound dimensions: up to 300m x 50m (width and length); and - six to twelve months construction duration per trenchless crossing location (does not include cable pulling duration). A crossings schedule is provided in **Volume 3, Appendix 4.1: Crossings Register** of the **EIA Report**. Temporary construction compounds: - up to three temporary primary construction compound locations (each up to 125m x 125m in area); - up to six temporary secondary construction compound locations (each up to 100m x 100m in area); and - construction of each joint bay will require a temporary construction compound (each up to 30m x 85m in area).	

Activity / impact	Maximum design scenario parameter	Justification
	Onshore export cable corridor construction works duration: • Phase 1 – up to two and a half years; • Phase 2 – up to one year; and • Phase 3 – up to one year. <u>Onshore substations:</u> • up to 150,000m² permanent area for the onshore substations with associated permanent access roads up to 42,000m², plus drainage / landscaping areas; and • up to 30,6000m² additional temporary construction compound area. Onshore substations construction works duration: • Phase 1 – up to three years; • Phase 2 – up to three years; and • Phase 3 – up to three years. **O&M:** <u>Onshore export cable corridor:</u> • Permanent cable corridor O&M widths (will be up to 61m for the onshore export cable corridor from the landfall(s) to the onshore substations and up to 71m for the onshore export cable corridor from the onshore substations to the grid connection point at SSEN Netherton Hub) • all permanent onshore export cable infrastructure including the landfall(s) will be below ground; and • minimal maintenance required (periodic testing at joint boxes every two to five years). <u>Onshore substations:</u> • up to 150,000 m² permanent area for onshore substations with two associated permanent access	

Activity / impact	Maximum design scenario parameter	Justification
	roads up to 4.2ha in area plus drainage / landscaping areas; and • each onshore substation will be operational for up to 35 years. Maximum main building height: • up to 17.5m for HVAC infrastructure; and • up to 30m for HVDC infrastructure. Maximum number of buildings (all infrastructure housed internally): 35. Maximum building length: • up to 78m for HVAC infrastructure; and • up to 104m for HVDC infrastructure. Maximum building width: • up to 40m for HVAC infrastructure; and • up to 88m for HVDC infrastructure. Maximum external infrastructure height: • up to 12m for HVAC infrastructure; and • up to 16.6m for HVDC infrastructure. Lightning mast height – up to 32m. The operational lifetime of each phase of the Project is up to 35 years from commissioning of WTGs. **Decommissioning** Onshore substations: • the onshore substations and associated access roads will be removed and the site reinstated; and • the decommissioning works are likely to be undertaken in reverse to the sequence of	

Activity / impact	**Maximum design scenario parameter**	**Justification**
	construction works and involve similar types and levels of equipment and vehicles. Assessment assumptions as per construction stage. Onshore export cable corridor: Onshore export cables will be left in-situ with ends cut, sealed and buried to minimise environmental effects associated with removal. The underground structures of the joint bays, FOC junction boxes and link boxes will be removed only if it is feasible with minimal environmental disturbance or if their removal is required to return the land to its current agricultural use.	
Impact 2: Increased human presence, noise and vibration - functionally linked non-designated habitat, supporting pink-footed geese, associated with Loch of Strathbeg SPA / Ramsar	Refer to Impact 1 within a 500m buffer.	A maximum design scenario assumes that development may take place anywhere within the Onshore Red Line Boundary. Direct effects on qualifying features of the SPA / Ramsar within non-designated functionally linked land within a 500m disturbance buffer of the Onshore Red Line Boundary, based on Goodship and Furness (2022).



Red Line Boundary

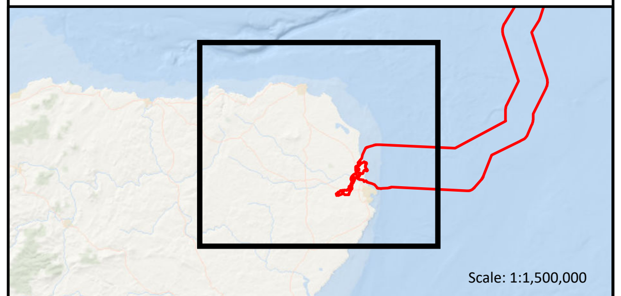
500m buffer around the Red Line Boundary

Pink-footed goose upper foraging range of 20km around the Loch of Strathbeg SPA/ Ramsar - extent of in combination effects assessment

Ramsar Site

Special Protection Area (SPA)

0 2,000 4,000 6,000 8,000 Metres



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2	22/10/2025	LT	AMc	AM	NC
1	26/09/2025	LT	AMc	AM	NC
REV	REV DATE	GIS CREATOR	GIS REVIEWER	TECHNICAL CHECKER	TECHNICAL APPROVER

WSP DRAWING NUMBER	808368-WEIS-IA-R4-FG-F4-72169
MarramWind DRAWING NUMBER	MAR-GEN-ENV-MAP-WSP-000597

DATUM	OSGB 1936	PROJECTION	British National Grid
SCALE	1:150,000	PAGE SIZE	A3

PROJECT TITLE

MarramWind Offshore Wind Farm

DRAWING TITLE

Figure 6 Maximum Design Scenario with respect to Loch of Strathbeg SPA and Ramsar

Report to Inform Appropriate Assessment (RIAA)

NOT TO BE USED FOR NAVIGATION

wsp MarramWind

Project commitments

5.4.2.4 A number of embedded environmental measures have been incorporated into the Project design to avoid or reduce potential adverse effects on pink-footed geese and to support the achievement of relevant COs as seen within **Table 5.13**.

5.4.2.5 The relevant embedded environmental measures within the design and their relevance to the pink-footed geese are detailed in Table 23.8 of **Volume 1, Chapter 23: Terrestrial Ecology and Ornithology** of the **EIA Report**. Further detail on the embedded environmental measures is provided in **Appendix B**, which identifies the scope of each measure, how and where it will be applied, and the securing mechanisms.

5.4.3 Construction stage

5.4.3.1 Construction activities associated with the Project with the potential to result in effects on the pink-footed geese a qualifying feature of the Loch of Strathbeg SPA / Ramsar are assessed under the maximum design scenario, as outlined in **Table 5.12** (see **Section 5.4.2** for full details).

5.4.3.2 Construction activities considered with potential to result in LSE include:

- pre-construction activities:
  - Pre-construction surveys (utility surveys, UXO surveys, water level surveys, remedial work in terms of any UXO, contamination or other adverse ground conditions; diversion and laying of services, including installation of temporary fencing; and geophysical and geotechnical site investigation surveys of the landfall(s) and onshore export cable corridor;
  - Vegetation will be cleared, where appropriate, from the working width of the onshore export cable corridor at the appropriate time of year.
  - Archaeological investigations, which may include intrusive investigations including archaeological trial trenching.
- construction activities including:
  - creation of temporary access roads, temporary construction compounds;
  - works associated with creation of below ground joint bays;
  - works associated with HDD or similar trenchless techniques at landfall(s);
  - works along the onshore export cable route corridor including export cable trenching; and
  - vehicular movements associated with construction.

5.4.3.3 The Project will be delivered in stages, which are reflected in in the construction programme (see **Plate 2.9**. Construction of onshore infrastructure is expected to be delivered in the range of up to nine years and it is expected that construction of the Project would commence in 2030.

5.4.3.4 Works at each of the landfall locations are expected to occur over a single winter season.

5.4.4 Operation and maintenance stage

5.4.4.1 The O&M stage of the Project includes no operational activities within the landfall(s) locations (including for this assessment, the Scotstown landfall). However, scheduled and unscheduled maintenance in relation to the transition joint bays and the associated landfall(s) section of the onshore export cable may comprise:

- Where a repair is required to a section of offshore export cable inside a landfall(s) duct, this would require mobilisation of a winch and associated equipment at the onshore end as with the original installation of cables at the landfall(s).
- Maintenance of the onshore export cable between the landfalls and the onshore substations is expected to be minimal. Ad-hoc visits may include the following activities for inspection / maintenance purposes.
  - Unscheduled maintenance or emergency repair visits may involve the presence of light vehicles, that would likely gain access using existing field and site accesses.
  - Infrequently, cables may be required to be replaced, and the use of an occasional heavy goods vehicle may be utilised, depending on the nature of the repair.
  - Subject to location, cable replacement may involve creating a temporary access using trackway or another temporary access road type, excavating to confirm the cable fault location using excavation equipment and excavating the required length of cable to enable repair.
  - Lighting during O&M activities is expected to be minimal. External lighting will be directional and limited to essential security and safety requirements. External works will usually be scheduled during daylight hours. If night working is required, then portable directional task lighting will be deployed.

5.4.4.2 These activities are assessed using the maximum design scenario, as outlined in **Table 5.12** (see **Section 5.4.2** for full details).

5.4.4.3 It is anticipated that the first phase of the Project would become fully operational in 2037 following commissioning of the WTGs for phase 1. It is anticipated the second phase of the Project would become fully operational in 2040 and the third phase in 2043. The operational lifetime of the Project for each phase is expected to be around 35 years (see **Section 4.1.2**).

5.4.5 Decommissioning stage

5.4.5.1 The decommissioning stage will commence at the end of the operational lifetime of the Project. The decommissioning duration of the onshore infrastructure may take the same amount of time as construction of the Project, up to 9 years, although this indicative timing may reduce. Materials would be reused or recycled, where possible, with the remainder of any material to be disposed with a licenced waste disposal site.

5.4.5.2 Prior to decommissioning taking place, an onshore decommissioning plan will be submitted and agreed Aberdeenshire Council before decommissioning works commence, following cessation of commercial operation.

5.4.5.3 It is anticipated that the onshore electrical cables will be left in-situ with ends cut, sealed and buried to minimise environmental effects associated with removal. The underground structures of the joint bays, FOC junction boxes and link boxes will be removed only if it is feasible with minimal environmental disturbance or if their removal is required to return the land to its current agricultural use. It should be noted that, whilst this is the current assumption, the regulations and practice applicable at the time of planning for decommissioning will be reviewed and followed. Further detail will be provided in an onshore decommissioning plan, prepared prior to the start of any decommissioning activities.

5.4.5.4 The decommissioning stage of the Project will involve the removal or safe abandonment of onshore infrastructure including cables. These activities are assessed using the maximum design scenario, as outlined in **Table 5.12** (see **Section 5.4.2** for full details).

5.4.5.5 The nature and scale of decommissioning activities are anticipated to be comparable to, or less than, those of the construction stage. Therefore, potential effects on the pink-footed geese qualifying features of the Loch of Strathbeg SPA / Ramsar are assessed jointly with the construction stage.

5.4.6 Summary of construction, operation and maintenance and decommissioning impacts for pink-footed geese

5.4.6.1 The activities outlined for construction, O&M and decommissioning stages have been assessed.

5.4.6.2 **Table 5.13** summarises the construction, O&M and decommissioning stage impacts on the pink-footed goose feature of the Loch of Strathbeg SPA / Ramsar, including relevant embedded environmental measures.

Table 5.13 Summary of construction, O&M and decommissioning impacts for pink-footed geese

Designated site	Qualifying feature(s)	Impacts	Embedded environmental measures
Loch of Strathbeg SPA / Ramsar	Pink-footed goose	Land take / land cover change to functionally-linked non-designated habitat.	M-002 M-009 M-027
		Increased human presence, noise and vibration to functionally linked non-designated habitat.	M-011 M-012 M-027 M-063 M-066 M-133 M-134 M-135

6. Assessment of Adverse Effects on Site Integrity Alone

6.1 Marine mammals

6.1.1 Moray Firth SAC

6.1.1.1 This Section assesses whether the Project alone would result in AEoSI of the Moray Firth SAC, with specific reference to the bottlenose dolphin qualifying feature. The assessment is structured by Project phase and impact pathway, and is informed by the COs, population context, and embedded environmental measures outlined in **Section 4.1** and **Section 5.2**.

6.1.1.2 Bottlenose dolphins are highly mobile, and their long-term maintenance within the SAC is intrinsically linked to their ability to access habitats and prey resources both within and outwith the SAC boundary. As such, potential impacts on functionally linked areas throughout the CES MU are relevant to this assessment. Furthermore, activities that can affect bottlenose dolphin both within and outwith the site are also considered if they could impair the ability of the population to remain a viable component of the site. Therefore, whilst the Project itself does not overlap with the SAC boundary, potential impacts on functionally linked areas and the CES MU have been considered.

Conservation objectives

6.1.1.3 The assessment is undertaken with respect to the COs for the bottlenose dolphin qualifying feature of the Moray Firth SAC (NatureScot, 2025c). The COs for the site are:

- **CO 1:** To ensure that the qualifying features of the Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS.
- **CO 2**: To ensure that the integrity of the Moray Firth SAC is maintained or restored in the context of environmental changes by meeting the following objectives (2a, 2b, and 2c) for each qualifying feature. For bottlenose dolphin:
  - **2a:** The population of bottlenose dolphin is a viable component of the site;
  - **2b**: The distribution of bottlenose dolphin throughout the site is maintained by avoiding significant disturbance; and
  - **2c:** The supporting habitats and processes relevant to bottlenose dolphin and the availability of prey for bottlenose dolphin are maintained.

Site-specific advice on conservation objectives

6.1.1.4 The following advice provides further detail on how the above COs should be interpreted and applied for the bottlenose dolphin feature of the Moray Firth SAC:

- For **CO 2a:** This objective seeks to minimise the risk to bottlenose dolphin from injury or mortality posed by activities. It protects the species from significant risk of incidental injury and injury within and outwith the site.
- For **CO 2b:** It is expected that significant disturbance will lead to more than a transient effect on the distribution of bottlenose dolphins and may result in the following effects:
  - contributes to the long-term decline in the use of the site by bottlenose dolphin;

    - changes to the distribution of bottlenose dolphin on a continuing or sustained basis; and
    - changes to bottlenose dolphin behaviour such that it reduced the ability of the species to survive, breed, or rear their young.
- For **CO 2c**: Supporting habitat refers to the characteristics of the seabed and water column relevant to their use by bottlenose dolphin. Any consideration of supporting habitat in appraisals should include the particular habitat requirements of bottlenose dolphin prey species.

6.1.2 Construction and decommissioning stages

6.1.2.1 This assessment considers the nature and scale of the construction impacts, as presented in **Table 5.2**. The nature and scale of decommissioning activities are anticipated to be comparable to, or less than, those of the construction stage. Therefore, potential effects on the bottlenose dolphin qualifying feature of the Moray Firth SAC from the decommissioning stage are assessed jointly with the construction stage.

6.1.2.2 The following sections assess each relevant impact pathway to determine whether construction and decommissioning stages of the Project alone could lead to an AEoSI on the bottlenose dolphin qualifying feature of the Moray Firth SAC, with respect to the COs.

Underwater noise

6.1.2.3 This Section addresses the UWN noise effects associated with the construction and decommissioning stages of the Project, focusing on two key pathways:

- the potential for auditory injury, comprising a PTS in hearing sensitivity; and
- disturbance and behavioural responses, ranging from temporary avoidance to displacement from important habitats.

6.1.2.4 The Project OAA and offshore export cable corridor is located approximately 90km from the Moray Firth SAC at the closest point. Therefore, all UWN sources considered will occur outside the SAC boundary. Whilst UWN will propagate away from the noise source and through the marine environment, the ZOI of the noise sources will not overlap with the SAC. As a result, there is no potential for UWN impacts within the SAC itself. The assessment instead considers whether bottlenose dolphin outwith the site could be exposed to UWN at levels that could lead to an effect and therefore an effect on the site.

6.1.2.5 In addition to the SAC, the CES MU, which supports the protected coastal bottlenose dolphin population associated with the Moray Firth SAC, lies approximately 50km from the Project OAA. This proximity has been considered when assessing potential exposure of individuals to UWN.

Underwater noise modelling

6.1.2.6 Noise modelling was undertaken for piling of WTG driven pile anchor and offshore substations and RCP jacket foundations (see **Volume 3, Appendix 8.1: Underwater Noise Modelling Assessment** of the **EIA Report**). The worst-case scenario assumes up to two piles are installed at a single location in a single day (for instance, within any 24-hours). In addition, scenarios involving sequential piling at two spatially separated locations were modelled to reflect the potential for increased cumulative exposure and wider impact areas.

6.1.2.7 Predictive modelling was undertaken by Subacoustech Environmental Ltd. using the Impulse Noise Sound Propagation and Impact Range Estimator (INSPIRE) v5.3 model. This modelling incorporates Southall *et al.* (2019) thresholds and site-specific environmental parameters, including bathymetry, sediment type, water depth, and source characteristics.

6.1.2.8 The primary impulsive noise source is impact piling of pin piles for offshore substations and RCP jacket foundations, and for driven pile anchors. Modelling was undertaken at seven representative locations covering the Project OAA and offshore export cable corridor, reflecting a range of water depths, distances to shore, and bathymetry conditions.

6.1.2.9 Two impact piling scenarios were modelled at the relevant locations:

- offshore substations and RCP: 3m driven pile diameter, 95m driven pile length installed to 0.5m proud of the seabed, installed with a maximum blow energy of 3,500kJ; and
- driven pile anchor: 3m driven pile diameter, 30m driven pile length installed to 0.5m proud of the seabed, installed with a maximum blow energy of 3,500kJ.

6.1.2.10 Both of these scenarios have been modelled following the installation scenario described in **Table 6.1**.

Table 6.1 Summary of the soft-start and ramp up scenario for offshore substations, RCP and driven pile anchor piling

Energy (kJ)	**320 (9%)**	**490 (14%**	**630 (18%)**	**1,330 (38%)**	**2,170 (62%)**	**2,660 (76%)**	**2,835 (81%)**	**3,500 (100%)**
No. of strikes	180	180	180	150	180	150	2,331	150
Duration (s)	1,800	360	360	300	360	300	4,662	300
3,501 strikes over 2 hours 20 minutes 42 seconds per pile. 7,002 strikes over 4 hours 41 minutes 24 seconds for two piles sequentially installed.								

6.1.2.11 In addition to these single-location piling scenarios, the modelling also considered sequential piling at two spatially separated locations to reflect the potential for simultaneous installation of offshore substation foundations and driven pile anchor. These scenarios were selected to represent the maximum geographical spread of impulsive noise sources, comprising piling at the southwest and north corners of the Project OAA, and a cross-site scenario involving the Project and the nearby Buchan Offshore Wind Farm.

6.1.2.12 Due to the deep water and the length of anchor piles being used, the impact piling will be undertaken subsea, with only 0.5m of the pile protruding above the seabed. A maximum of two piles can be sequentially installed in a 24-hour period from a single piling vessel. Where multiple sequential piles are modelled, no break has been assumed between each one as a worst-case scenario.

6.1.2.13 No mitigation measures such as Acoustic Deterrent Devices (ADDs) were included in the modelling. As such, the predicted exposure ranges represent a precautionary worst-case scenario without mitigation.

6.1.2.14 Additional modelling was undertaken for other potential noise sources other than impact piling, including:

- UXO clearance (both high order and low order detonations);
- operational noise from WTG and cables; and
- non-impulsive noise making activities, such as drilling, dredging, trenching, suction pile installation, rock placement, cable laying, and vessel noise (both large and medium levels).

6.1.2.15 The largest modelled ranges from impact piling at the Project are predicted from the northern offshore substation pin pile foundation location due to the greater water depth; however, subsea piling and generally similar water depths across the array mean impact ranges were comparable across the locations. Full results of the UWN modelling and the resulting impact areas and spatial ranges are provided in **Volume 3, Appendix 8.1** of the **EIA Report**.

Assessment background

6.1.2.16 The assessment follows a source-pathway-receptor framework, informed by predictive modelling using species-specific sensitivity and frequency-weighted thresholds outlined by Southall *et al*. (2019). Bottlenose dolphins are classified as high frequency (HF) cetaceans, with an estimated hearing range of 150 hertz (Hz) to 160 kilohertz (kHz), and an estimated region of peak sensitivity between 8.8kHz and 110kHz (Southall *et al*., 2019).

6.1.2.17 Noise exposure criteria are typically represented by dual exposure metrics including the frequency weighted sound exposure level (SEL; expressed in decibel (dB) re. 1 micropascal ($\mu Pa^2 s$) and the unweighted sound pressure level (SPL; expressed in dB relative to 1 µPa in water). 'Weighted' metrics adjust for the auditory sensitivity of the receptor (for instance, the frequencies audible to the species group), whereas 'unweighted' metrics present received levels of independent of hearing sensitivity (Southall *et al*., 2019).

6.1.2.18 UWN sources during offshore construction and decommissioning can vary considerably in character, duration, and potential effect. For assessment purposes, these sources are broadly classified into two types based on their acoustic characteristics:

- Impulsive noise:
  - sound with a high peak pressure, short duration, fast rise-time and a broad frequency content at the source;
  - such noise can deliver a large amount of acoustic energy in a very short time, which can potentially lead to auditory injury in marine mammals if exposure occurs at close range; and
  - examples include impact piling for foundations, UXO clearance, and some geophysical sources.
- Non-impulsive noise:
  - continuous or intermittent sound sources, lacking the sharp onset of impulsive noise which does not necessarily have a long duration;
  - while the risk of instantaneous injury is lower, prolonged exposure may contribute to behavioural disturbance or temporary masking of biologically important sounds; and
  - examples include drilling, vibropilling, and vessel propulsion.

6.1.2.19 The distinction between impulsive and non-impulsive noise is critical for impact assessment because different metrics are used to evaluate potential auditory injury and disturbance in marine mammals.

6.1.2.20 Impulsive sources are assessed using unweighted peak sound pressure level (SPL_{peak} or $L_{p,pk}$; dB re 1μPa), representing the maximum instantaneous pressure level at the receptor, and frequency-weighted cumulative sound exposure level (SEL_{cum} or $L_{E,p,t}$; dB re 1μPa^{2}s) over the duration of a discrete noise exposure event within a 24-hour period, accounting for repeated exposure. Non-impulsive sources use SEL metrics only, reflecting the importance of accumulated noise over time rather than short-term peak pressures.

6.1.2.21 The noise modelling results were then compared to the marine mammal exposure criteria from Southall *et al*. (2019), which defines PTS and temporary threshold shift (TTS) onset thresholds for HF cetaceans (**Table 6.2**). These thresholds are used to determine the spatial extent within which auditory impacts (for example, injury and proxy for disturbance respectively) may occur, based on both cumulative (SEL_{cum}) and instantaneous (SPL_{peak}) exposure metrics. Further information on the modelling approach and the methods used the calculate PTS-onset impact ranges is provided in **Volume 3, Appendix 8.1** of the **EIA Report**.

Table 6.2 Noise exposure criteria from Southall *et al*. (2019) for the PTS and TTS in hearing for bottlenose dolphins for both impulsive and non-impulsive sound sources

Southall *et al.* (2019)	**Impulsive**				**Non-impulsive**	
	Unweighted SPL_{peak} (dB re 1μPa)		**Weighted SEL_{cum} (dB re 1μPa^{2}s)**		**Weighted SEL_{cum} (dB re 1μPa^{2}s)**	
	PTS	**TTS**	**PTS**	**TTS**	**PTS**	**TTS**
HF cetaceans	230	224	185	170	198	178

Auditory injury

6.1.2.22 This Section assesses the potential for the Project, alone, to result in auditory injury from UWN to the bottlenose dolphin qualifying feature of the Moray Firth SAC during construction and decommissioning. The assessment is undertaken with reference to the following site COs:

- **CO 1:** To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS; and
- **CO 2a:** The population of bottlenose dolphin is a viable component of the site.

6.1.2.23 Auditory injury in marine mammals occur when sound levels exceed species-specific hearing thresholds, causing a PTS-onset, where hearing sensitivity is reduced in the affected frequency bands with no recovery (Tougaard, 2021). PTS can occur instantaneously (via impulsive noise sources such as pile driving) or cumulatively (for instance, exposed to the injurious sound source over an extended period). While PTS is considered a permanent effect, the most likely response of an animal exposed to noise levels that could induce PTS is to flee the ensonified area. Therefore, animals exposed to these noise levels are likely to actively avoid hearing damage by moving away from the area.

6.1.2.24 To interpret the modelled PTS-onset ranges in a population context, they were converted into spatial areas and combined with density estimates for bottlenose dolphins within the wider CES MU. Density values were derived from Cheney *et al.* (2024) for nearshore waters (0.116 individuals/km² within 2km of the coast) and from SCANS-III survey block R (Hammond *et al.,* 2021) for offshore waters (0.0298 individuals/km²). For precautionary purposes, the higher nearshore density was applied in the assessment. This spatially explicit approach allows for an estimation of the number of individuals potentially exposed to injurious sound levels, thereby informing the assessment of impacts in relation to CO1 and CO2a.The following sections presents the results of this assessment for each construction or decommissioning-related activity.

Pre-construction surveys

6.1.2.25 Geophysical and geotechnical surveys of the Project OAA and offshore export cable corridor will be conducted to inform final design and installation planning for the Project. These surveys will be undertaken by a dedicated marine survey vessel and / or remotely operated vehicle and will identify bedforms, obstacles and debris on the seabed within the Project OAA and offshore export cable corridor.

6.1.2.26 Geotechnical surveys involve physical sampling and testing of the seabed substrate (for example, boreholes, cone penetration tests) to determine sediment composition, strength, and stability. These activities are mechanical rather than acoustic in nature and do not generate significant UWN levels. As such, they are not considered to pose a risk of auditory injury to bottlenose dolphins and are excluded from further assessment. However, an USBL positioning system may be used during a geotechnical survey. The USBL emits acoustic pulses for accurate location of equipment and therefore could lead to noise impacts. As USBL systems are also used during geophysical surveys and produce noise that is more similar to geophysical sources, the assessment of impacts from the USBL is included under geophysical surveys.

6.1.2.27 Geophysical surveys involve acoustic mapping of the seabed using geophysical survey equipment commonly deployed in offshore wind farm site investigations. These systems are generally towed behind or mounted on survey vessels. ROVs may also be used for visual inspection of seabed features and debris; these are passive, meaning they do not generate UWN of concern. However, ROVs can be mounted with acoustic positioning systems, such as an USBL, to aid operators in locating their equipment underwater. Depending on the system’s acoustic signal, these devices have the potential to impact marine mammals (Mikaelsen *et al.,* 2025).

6.1.2.28 Passive equipment, such as magnetometers, measure incoming signals, such as magnetic signatures, and do not emit sound; therefore, they pose no risk of auditory injury to marine mammals. These types of equipment are excluded from further consideration.

6.1.2.29 As the exact equipment to be used for the Project’s pre-construction surveys is not yet confirmed, this assessment is based on representative source levels and frequency characteristics of indicative equipment used in similar offshore wind farm developments. These will be refined and confirmed as part of the Final Marine Mammal Mitigation Protocol (MMMP; M-032) prior to survey commencement.

6.1.2.30 The potential sensitivity of bottlenose dolphins (classified as HF cetaceans) to injury from pre-construction surveys is dependent on both the characteristics of survey equipment and the species’ hearing range. **Table 6.3** provides a summary of typical source levels and frequency ranges for a variety of pre-construction survey equipment, as well as the overlap with bottlenose dolphin hearing sensitivity, and indicates whether the typical source levels are below the auditory injury (PTS) onset criteria defined by Southall *et al*. (2019).

Table 6.3 Comparison of indicative geophysical survey equipment sound characteristics compared to bottlenose dolphin (HF cetacean) hearing

Survey equipment	Typical source level (dB re 1µPa)	Expected frequency range	Frequency overlap with HF cetaceans	Below PTS threshold?
MBES	200-240 (SPL_{peak}; Hartley Anderson, 2020) 210-240 (SPL_{peak}; Lurton and Deruiter, 2011).	200-400kHz (Hartley Anderson, 2020).	No	N/A
SSS	210 (SPL_{peak}; Crocker and Fratantonio, 2016, Crocker *et al.*, 2019).	300–900kHz (Crocker and Fratantonio, 2016, Crocker *et al.*, 2019.	No	N/A
SBP	185-250 (SPL_{peak}; dependent on equipment type; Hartley Anderson, 2020) 174-247 (SPL_{rms}) (dependent on equipment type; (National Oceanic and Atmospheric Administration (NOAA), 2019).	0.1–22kHz (Hartley Anderson, 2020).	Yes	Yes
UHRS sparker	200-226 (SPL_{peak}; Hartley Anderson, 2020).	0.1–5kHz (Hartley Anderson, 2020).	Yes	Yes
USBL positioning system	188-204 (SPL_{rms}; NOAA, 2019). 187-206 (SPL_{rms}; Jiménez-Arranz *et al.*, 2020).	17–50kHz (NOAA, 2019).	Yes	Yes

6.1.2.31 The sound frequencies generated by MBES and SSS are above the frequency range of bottlenose dolphins (Hartley Anderson Ltd, 2020, Crocker and Fratantonio, 2016, Crocker *et al.,* 2019). Therefore, this equipment does not pose a risk of auditory injury and are not considered further in this assessment.

6.1.2.32 The sound frequencies emitted by USBL, SBP and UHRS equipment are within the hearing range of bottlenose dolphin. The indicative maximum source levels for the SBP exceeds the unweighted injury threshold for bottlenose dolphins; however, the source levels of USBL, and UHRS equipment are below the instantaneous PTS-onset thresholds for bottlenose dolphins (for instance, ≥230dB; Hartley Anderson Ltd, 2020, NOAA, 2019). Although some SBP equipment have been recorded to emit noise up to 250 dB (SPL_{peak}), the majority of equipment emits noise under 215 dB (SPL_{peak}); therefore, for the majority of geophysical equipment it is considered that there is no potential for instantaneous auditory injury from this geophysical survey equipment, unless the animal is within close proximity to the sound source for equipment at the higher range.

6.1.2.33 There is the potential that geophysical and geotechnical surveys could occur within the CES MU which is overlapped by the offshore export cable corridor, however the auditory injury ZOI would comprise a negligible proportion of the CES MU.

6.1.2.34 Modelling conducted by CSA Ocean Sciences (2020) using the United States of America's (USA's) National Marine Fisheries Service (NMFS) User Spreadsheet (NMFS, 2018) indicates that even for a wide range of geophysical survey equipment, the maximum predicted PTS-onset impact range is less than 36.5m. While cumulative exposure thresholds (SEL_{cum}) are also considered, exceeding these would require a bottlenose dolphin to remain continuously within 36.5m of the active source for a full 24-hour period. Given the species' mobility and typical avoidance behaviour in response to vessel activity and acoustic sources, such prolonged exposure is considered highly unrealistic. Therefore, the risk of cumulative auditory injury from pre-construction survey activities is considered Negligible.

6.1.2.35 JNCC (2017) guidelines for geophysical surveys emphasise the importance of proportionate mitigation to reduce the risk of injury to marine mammals. The recommended mitigation measures by JNCC for geophysical surveys primarily comprise monitoring for marine mammals within a standard mitigation zone, to minimise the likelihood of close-range exposure. These measures will be outlined in the MMMP (M-032) and followed during geophysical (and where relevant, geotechnical) surveys for the Project. Environmental measures, including the MMMP (M-032) and Outline EMP (M-121) will be implemented to manage the effect of UWN in accordance with the SNCB latest guidance (for instance, JNCC, 2017).

6.1.2.36 While bottlenose dolphins from the Moray firth SAC population are not expected to be present in the Project OAA, surveys along the offshore export cable corridor may intersect with nearshore habitats or movement corridors where presence is more likely, for instance, the CES MU. Due to the highly localised nature of the predicted PTS-onset ranges (≤36.5m) and the application of environmental measures (see **Table 5.3**), auditory injury to the bottlenose dolphin qualifying feature of the Moray Firth SAC is not expected to occur. Therefore, auditory injury from pre-construction surveys is not predicted to result in any significant negative effects on individuals or the population associated with the Moray Firth SAC, nor is it expected to result in injury (or death) to an extent that may ultimately affect population viability (CO 2a) or favourable condition (CO 1). It is therefore concluded that the Project alone will not result in any AEoSI in relation to auditory injury from pre-construction surveys during piling or decommissioning, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Piling

6.1.2.37 To quantify the impact of UWN on bottlenose dolphins with regard to PTS, the instantaneous (SPL_{peak}) and cumulative (SEL_{cum}) PTS-onset impact ranges (for instance, the area around the piling location within which the noise levels exceed the PTS-onset thresholds for bottlenose dolphin) are determined using the thresholds presented by Southall *et al*. (2019; see **Table 6.2**).

6.1.2.38 Modelling predicts maximum instantaneous PTS-onset impact range for bottlenose dolphin is predicted to be less than 50m from the sound source. The maximum cumulative PTS-onset range is less than 100m, for offshore substations and RCP pin pile foundation, and driven pile anchor installation at all modelling locations. These values remain consistent even under sequential piling scenarios involving two spatially separated locations within the Project OAA, which were modelled to reflect a realistic worst-case scenario for cumulative exposure.

6.1.2.39 As an unmitigated maximum value, the predicted PTS onset impact ranges for bottlenose dolphin under the maximum design scenario at all locations is at most 100m from the noise source. These distances are significantly smaller than the distance to the Moray Firth SAC (150km distance from the Project OAA) and the CES MU (approximately 50km from the Project OAA). It is highly unlikely that individuals from the population associated with the Moray Firth SAC would be within the PTS-onset impact area; therefore, the risk of auditory injury is predicted to be **Negligible**.

6.1.2.40 Piling noise typically contains most of its energy between ~30–500Hz, peaking between 100–300Hz, with some energy extending beyond 2kHz (Kastelein *et al*., 2015; 2016). These frequencies are within the hearing range of bottlenose dolphins but largely below their region of peak sensitivity (Southall *et al*., 2019). Even if PTS were to occur in a small number of individuals, the magnitude and frequency range of such shifts would not be sufficient to affect an individual's fitness (for example, its ability to survive or reproduce; Kastelein *et al.,* 2017; Booth *et a*l., 2019) and therefore, would not compromise the site's COs.

6.1.2.41 Environmental measures, including the MMMP (M-032), piling strategy (M-105) and Outline EMP (M-121), will be implemented to manage the effect of UWN in accordance with the latest SNCB guidance (for instance, JNCC, 2010a).

6.1.2.42 Due to the highly localised PTS-onset ranges (≤100m), the likely absence of bottlenose dolphins within the Project OAA (especially the inshore, coastal population belonging to the Moray Firth SAC), and the application of environmental measures (see **Table 5.3**, auditory injury to the bottlenose dolphin qualifying feature of the Moray Firth SAC is not expected to occur. Should PTS-onset occur, bottlenose dolphins are expected to have limited sensitivity to the potential PTS. Therefore, auditory injury from piling is not predicted to result in any significant negative effects on individuals or the population associated with the Moray Firth SAC, nor is it expected to result in injury (or death) to individuals to an extent that may ultimately affect population viability (CO 2a) or favourable condition (CO1).

6.1.2.43 It is therefore concluded that the Project alone will not result in any AEoSI in relation to auditory injury from pile driving during construction or decommissioning stages, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Unexploded ordnance clearance

6.1.2.44 UXOs with varying charge weights may be present within the boundaries of the Project OAA and offshore export cable corridor. While avoidance, removal, or relocation of identified UXO is preferred, underwater detonation may be necessary where removal is deemed unsafe. As the detailed pre-construction surveys have not yet been completed, it is not possible at this time to determine how many items (if any) of UXO will require clearance. Therefore, UXO clearance will be pursued under a separate UXO marine licence, to be applied for post-consent, if required. For completeness, a high-level assessment is included in this RIAA.

6.1.2.45 The preferred clearance method is low order detonation, with high order detonation considered a maximum design scenario and used only as a last resort, in line with the UXO Joint Position Statement (UK Government, 2025; Marine Directorate, 2025) and the embedded environmental measures (M-114; see **Table 5.3**). To ensure that the maximum design scenario has been assessed, both methods are included in the impact assessment (see **Volume 3, Appendix 8.1** of the **EIA Report** for full details).

6.1.2.46 Assessments are based on a range of representative charge weights (0.25kg) being for low order, and 25-907kg plus a 0.5kg donor charge for high order). UXO clearance is modelled as a high-energy impulsive source. Both weighted single pulse (SEL_{ss}) and unweighted SPL_{peak} thresholds from Southall *et al*. (2019) are used in the assessment of UXO noise (see **Table 6.2**).

6.1.2.47 For the purposes of this assessment, UXO clearance has been modelled at a representative location within the CES MU, representing a precautionary maximum design scenario in terms of spatial overlap with the bottlenose dolphin population associated with the Moray Firth SAC. This ensures that any potential auditory injury is evaluated in the context of the most sensitive and relevant population unit.

6.1.2.48 The maximum precited PTS-onset impact ranges for bottlenose dolphin from a high order UXO clearance (907kg + donor) is 880m (using the SPL_{peak} criterion). This equates to a maximum of one individual (0.12% of the CES MU population) potentially within auditory injury range.

6.1.2.49 For low order clearance, the maximum predicted PTS-onset impact range is 60m (using the SPL_{peak} criterion), with fewer than one individual (<0.01% of the CES MU population) at risk of auditory injury. These estimates are precautionary in that they do not consider the application of mitigation for marine mammals, which will be applied to reduce the risk of auditory injury from UXO clearance following JNCC (2025) UXO guidelines.

6.1.2.50 Most of the acoustic energy produced by high order detonation is concentrated below a few hundred hertz, with a pronounced reduction above 5–10kHz (von Benda-Beckmann *et al*., 2015; Robinson *et al.,* 2022). These frequencies are within the hearing range of bottlenose dolphins but largely below their region of peak sensitivity (Southall *et al*., 2019; see **Table 6.2**). Therefore, even if PTS were to occur in a small number of individuals, the magnitude and frequency range of such shifts would not be sufficient to result in a significant impact on the vital rates of an individual bottlenose dolphin (Booth *et al*., 2019), and therefore, would not compromise the site's COs.

6.1.2.51 Other supporting environmental measures include the MMMP (M-032), UXO management plan (M-115) and Outline EMP (M-121), all to be implemented in line with the latest SNCB guidance (for instance, **Table 5.3** (JNCC, 2025)). These documents will be updated prior to construction, to capture the final refined project parameters and latest guidance.

6.1.2.52 Due to the very small number of individuals (maximum one) and proportion of the population (≤0.12% of the CES MU) potentially exposed to auditory injury, and the application of environmental measures (see **Table 5.3**), auditory injury to the bottlenose dolphin qualifying feature of the Moray Firth SAC is not expected to occur. Should PTS occur, bottlenose dolphins are expected to have limited sensitivity to the potential PTS. Therefore, auditory injury from UXO clearance is not predicted to result in significant negative effects on individuals or the population associated with the Moray Firth SAC, nor is it expected to result in injury to individuals to an extent that may ultimately affect population viability (CO 2a) or favourable condition (CO 1). It is therefore concluded that the Project alone will not result in any AEoSI in relation to auditory injury from UXO clearance during construction or decommissioning, and that, subject to natural change, the population of bottlenose dolphins will be maintained in the long-term.

Other construction activities

6.1.2.53 Other construction activities that may generate noise include trenching, dredging, jetting, drilling, cable laying, rock placement, and vessel operations. These are characterised as non-impulsive and continuous noise sources (see **Volume 3, Appendix 8.1** of the **EIA Report** for further details). Typical source levels and frequency characteristics for these activities vary depending on the equipment and method used. The assessment uses SEL_{cum} over a precautionary 24-hour continuous operation scenario.

6.1.2.54 Source levels for support and supply vessels (50–100m in length) typically range from 165–180dB re 1µPa at 1m (SPL root mean square; SPL_{rms}), with most energy below 1kHz (OSPAR, 2009). Large commercial vessels (>100m) produce louder source levels (180–190dB re 1µPa at 1m or more) concentrated below several hundred hertz (OSPAR, 2009;

Erbe *et al*., 2018). Small vessels emit source levels of 130–175dB re 1µPa at 1m with proportionally more high-frequency components above 1kHz (Erbe *et al*., 2018). According to the Marine Management Organisation (2015), the main energy of non-piling construction activities such as dredging, trenching, drilling and cable installation, is listed as being below 1kHz. These frequencies overlap the hearing range of dolphin species, though they fall outside the peak hearing range (Southall *et al.,* 2019).

6.1.2.55 The maximum cumulative (SEL_{cum}) PTS-onset impact range for bottlenose dolphins is predicted to be less than 100m for the other construction activities. These distances are significantly smaller than the distance to the Moray Firth SAC (90km distance to the Project offshore export cable corridor). and represent a negligible overlap of the wider to the CES MU. There is the potential that some other construction activities could occur within the CES MU which is overlapped by the offshore export cable corridor, however the auditory injury ZOI would comprise a negligible proportion of the CES MU.

6.1.2.56 If PTS were to occur as a result of exposure to low-frequency noise from these activities, it would likely result in a “notch” of reduced hearing sensitivity in a frequency range that is not critical to bottlenose dolphin fitness (for instance, survival or reproduction). Current scientific understanding suggests that such shifts would not significantly affect vital rates in either adults or calves (Kastelein *et al*., 2017; Booth *et al*., 2019). Furthermore, the nature of these activities and associated vessel movement is expected to deter animals from entering the small, predicted PTS-onset zones.

6.1.2.57 While bottlenose dolphins are not expected to be present in the Project OAA, other construction activities along the offshore export cable corridor may intersect with nearshore habitats or movement corridors where presence is more likely, for instance, the CES MU. Due to the highly localised nature of the predicted PTS-onset ranges (≤100m) and the application of environmental measures (M-039; M-121; see **Table 5.3**), auditory injury to the bottlenose dolphin qualifying feature of the Moray Firth SAC is not expected to occur. Should PTS occur, bottlenose dolphins are expected to have limited sensitivity to the potential PTS. Therefore, auditory injury from other construction activities is not predicted to result in any significant negative effects on individuals or the population associated with the Moray Firth SAC, nor is it expected to result in injury to an extent that may ultimately affect population viability (CO 2a) or favourable condition (CO1).

6.1.2.58 It is therefore concluded that the Project alone will not result in any AEoSI in relation to auditory injury from non-piling related activities during construction or decommissioning, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Behavioural disturbance

6.1.2.59 This Section assesses the potential for the Project, alone, to result in behavioural disturbance from UWN to bottlenose dolphins associated with the Moray Firth SAC during construction and decommissioning. The assessment is undertaken with reference to the following site COs:

- **CO 1:** To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS; and
- **CO 2b:** The distribution of bottlenose dolphin throughout the site is maintained by avoiding significant disturbance.

6.1.2.60 For the purposes of this assessment, significant disturbance is defined in line with JNCC (2019) and NatureScot (2025c) guidance as any impact that results in more than a transient effect on the distribution of bottlenose dolphins. Such disturbance may result in the following effects:

- contributes to the long-term decline in the use of the site by bottlenose dolphin;
- changes to the distribution of bottlenose dolphin on a continuing or sustained basis; and
- changes to bottlenose dolphin behaviour such that it reduced the ability of the species to survive, breed, or rear their young.

6.1.2.61 UWN generated during construction and decommissioning has the potential to cause behavioural disturbance in bottlenose dolphins. Documented responses include temporary avoidance, displacement from preferred habitats, altered foraging or social behaviours, and stress-related effects (Brandt *et al*., 2011; Culloch *et al.,* 2016; Pirotta *et al.,* 2014; Stone *et al*., 2017). While such effects are often reversible, repeated or prolonged changes can reduce individual fitness, particularly if they result in reduced access to prey or disruption of breeding and calving behaviours (Nabe-Nielsen *et al*., 2018).

6.1.2.62 The severity of a marine mammal's response to disturbance depends on individual sensitivity, prior exposure, and environmental context. In historically noisy areas, habituation may reduce aversive reactions. The USA's NMFS (2024) defines strong disturbance in all marine mammals as "Level B harassment" and for non-explosive impulsive noise suggests a threshold of 160dB re 1μPa (SPL_{rms}). This aligns with criteria defined by JNCC (2010) for 'non-trivial' (for instance, significant) disturbance and corresponds to the Southall *et al*. (2007) severity score of five or more on the behavioural response scale. Consequently, at noise levels below this threshold, the behavioural responses are likely to be less severe (for example, minor changes in speed, direction and / or dive profile, modification of vocal behaviour and minor changes in respiratory rate (Southall *et al.,* 2007)).

6.1.2.63 An alternate method for assessing behavioural disturbance is to use a dose-response approach, which is considered more precautionary and spatially explicit. This method estimates the likelihood of behavioural response based on the received noise level, allowing for a graded interpretation of disturbance rather than applying a fixed threshold. It is important to note that the dose-response threshold is derived from harbour porpoise response to pile driving and may overestimate disturbance for other species, for instance, bottlenose dolphins which are known to exhibit site fidelity and behavioural plasticity. TTS is also used as a proxy for disturbance for other activities. Behavioural disturbance is further explained within Section 11.8.3 within **Volume 1, Chapter 11: Marine Mammals** of the **EIA Report**.

6.1.2.64 A quantitative approach has been applied to assess behavioural disturbance from noise sources, using current best practice methodologies specific to the noise source being assessed.

Pre-construction surveys

6.1.2.65 The sound frequencies generated by MBES and SSS are above the auditory range of bottlenose dolphins and are therefore not expected to cause behavioural disturbance. SBP, UHRS, and USBL systems operate within the hearing range of bottlenose dolphins and may elicit temporary behavioural responses. However, the acoustic energy from these systems is typically directed down towards the seabed and water column, where it rapidly dissipates Therefore, any disturbance is expected to be highly localised and contained within the immediate footprint of the vessel, with limited duration of exposure (Pace *et al*., 2021).

6.1.2.66 JNCC guidance for assessing disturbance in harbour porpoise SACs recommends a 5km effective deterrent range (EDR) for other (non-airgun) geophysical surveys (JNCC, 2020). In the absence of species-specific guidance, it has been applied to bottlenose dolphins in this assessment of disturbance from pre-construction surveys. To note, the EDR has been used to reflect that 'instantaneous' disturbance at any given time; it does not account for distance covered by the survey vessel per day. JNCC (2020) note that the 5km EDR for harbour porpoise is likely conservative. For bottlenose dolphins, the maximum number predicted to be disturbed by pre-construction surveys was four individuals (1.65% of the CES MU; assuming that the survey occurred fully within the CES MU) using the 5km EDR.

6.1.2.67 Behavioural disturbance from pre-construction geophysical surveys has also been assessed using modelled data from CSA (2020), which provides the Level B harassment ranges in the absence of widely accepted behavioural thresholds (for example, Southall *et al.,* 2019). Based on these data, CSA (2020) identifies that behavioural disturbance (Level B harassment) may occur up to 141m from geophysical survey sound sources. However, CSA (2020) anticipated that displacement caused by the physical presence of survey vessels will have a greater behavioural impact than UWN from survey equipment. As such, CSA (2020) did not expect that geophysical surveys will result in significant behavioural disturbance. These results also highlight that applying the EDR for bottlenose dolphin is highly precautionary.

6.1.2.68 Pre-construction geophysical surveys for the Project are expected to occur during the early stages of each construction stage, with an estimated duration of one year per phase (across years 1–2, 4–5, and 7–8). Therefore, surveys could take place over an approximate seven-year period (years 1–8). Surveys are expected to be intermittent throughout this period, and will be mobile, resulting in temporary disturbance of an area that animals can return to once the survey vessel has moved location. This limited and intermittent temporal scope further supports the conclusion that any behavioural disturbance will be short-term and reversible.

6.1.2.69 Environmental measures, including the MMMP (M-032) and Outline EMP (M-121), will be implemented in accordance with the latest SNCB guidance (for example, JNCC, 2017; see **Table 5.3**). These measures will be refined prior to construction to reflect final survey parameters.

6.1.2.70 While bottlenose dolphins are not expected to be present across the Project OAA, surveys along the offshore export cable corridor may intersect with nearshore habitats or movement corridors where presence is more likely for instance, the CES MU. Given the small spatial footprint of the predicted disturbance impact (highly conservative 5km, or more realistic ≤141m), which will be temporally limited in any one area, and the intermittent nature of the surveys over the seven-year period, any behavioural responses are considered to be localised, short and reversible. This small number of bottlenose dolphin disturbed on a temporary basis is not expected to reduce the ability of the species to survive, breed or rear their young. Given the separation between geophysical surveys and the Moray Firth SAC, the activity will not contribute to any long-term decline in the use of the site by bottlenose dolphin. Therefore, disturbance from pre-construction surveys is not predicted to result in any significant negative effects on individuals or the population associated with the Moray Firth SAC, nor is it expected to result in changes in distribution (CO 2b) or compromise favourable condition (CO 1). It is therefore concluded that the Project alone will not result in any AEoSI in relation to behavioural disturbance from pre-construction geophysical surveys during construction or decommissioning, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Piling

6.1.2.71 Behavioural disturbance from piling has been assessed using a dose-response function based on received noise levels. This approach, derived from harbour porpoise data (Graham *et al.*, 2017a), is precautionary when applied to bottlenose dolphins, given the higher sensitivity of harbour porpoises to acoustic disturbance.

6.1.2.72 For the purpose of this assessment, the dose is the received single-strike sound exposure level (SEL_{ss}) which is considered to be best practice for this type of assessment (Southall *et al.*, 2021). SEL_{ss} contours at 5dB intervals generated by noise modelling (see **Volume 3,**

Appendix 8.1 of the **EIA Report**) were overlain on species density surfaces to quantify the number of animals receiving each SEL_{ss}, and subsequently the number of animals likely to be disturbed based on the dose-response curve.

6.1.2.73 Based on this dose-response modelling, the maximum number of bottlenose dolphins predicted to be disturbed during piling is 60 individuals, representing 26.55% of the CES MU population, which is presumed synonymous with Moray Firth SAC population. This estimate is associated with the south (S) RCP location and reflects a precautionary maximum design scenario. However, this value has not been incorporated with the assessment as it is estimated that installation of the piles at this location will only occur across two days. Therefore, the north (N) offshore substation location was used as the input to Interim Population Consequences of Disturbance (iPCoD), representing the worst-case scenario applicable to the majority of piling days, with a predicted disturbance of 31 individuals from the CES MU. Full details on the model parameters, assumptions and limitations are provided in **Volume 3: Appendix 11.2: Population Distribution Modelling** of the **EIA Report**. iPCoD modelling is used to assess potential population-level consequences for piling and was carried out using disturbance estimates derived from piling activities using the maximum design scenario parameters outlined in **Table 5.2**.

6.1.2.74 Although iPCoD modelling has a number of precautions built into it, which means that results are considered to be highly conservative and provide a worst-case scenario of the effects of disturbance on a population level, it is based according to current best practice and uses the best scientific information at this time. A full description of the model's limitations and uncertainties are found within **Volume 3, Appendix 11.2**. Some examples of the precautions used include assuming a greater number of piles than the Maximum Design Scenario (MDS) to allow for a higher proportion of foundations to be installed during the final construction stage. It is also assumed that all structures will require piled foundations; however, in practice, some foundations may use alternative methods that do not involve driven piles (see **Volume 1, Chapter 4: Project Description** of the **EIA Report**). Furthermore, the modelling assumes continuous piling throughout the designated years, with one or two piles installed daily. This is unlikely to occur due to downtime caused by adverse weather or operational breaks. Considering the level of limitations and uncertainty in the modelling, the number of animals disturbed per day are expected to be lower than the ones presented in this assessment.

6.1.2.75 The modelling examined the potential impacts of piling and indicated that, even under this precautionary worst-case scenario, the affected population is projected to maintain a stable growth trajectory, comparable to that of an unimpacted population. During the phased piling years, the size of the impacted population relative to the unimpacted population has a maximum deviation of 10.49%, which occurs one year after piling ends. While the impacted CES MU population size is reduced compared to the un-impacted population size, it continues to increase in size even throughout the piling activities. After 18 years post-piling, the impacted population is projected to reach 511 individuals, compared with 560 in the unimpacted scenario, equivalent to 8.75% deviation from the unimpacted population. Both 511 and 560 represent a substantial increase from the pre-piling (start 2033) estimate of 228 individuals.

6.1.2.76 Level B harassment thresholds, as defined by NMFS (2024) for impulsive, non-explosive sources have also been considered to provide context. Using the defined 160dB re 1μPa (SPL_{rms}) thresholds in this assessment, the Level B threshold predicts that a maximum of 18 bottlenose dolphins (8.11% of the CES MU population) would be disturbed at a single location (RCP South).

6.1.2.77 The piling window for the Project spans 2030-2042 (up to 12 years). However, the maximum design scenario assumes up to 1,856 piling days in total within that window, which is substantially less than continuous activity across the full window. Piling will occur in discrete campaigns with breaks between operations, meaning that disturbance will be intermittent and temporary rather than sustained over the entire period.

6.1.2.78 While offshore construction activities have been known to cause temporary displacement of bottlenose dolphins due to noise (Pirotta *et al*., 2013), studies such as Graham *et al*. (2017a) observed that dolphins were not excluded from the vicinity of piling sites. Bottlenose dolphins are known to exhibit behavioural flexibility and may tolerate certain levels of temporary disturbance (New *et al.,* 2013). Expert elicitation for iPCoD concluded that such disturbance from piling is unlikely to affect adult survival or reproductive rates (Harwood *et al*., 2014).

6.1.2.79 In summary, the assessment has undertaken a precautionary approach by applying the harbour porpoise dose-response function and has determined that the number of bottlenose dolphin that may be disturbed is moderate (maximum 26.55% of the CES MU population, or 60 individuals at RCP South (modelled to occur over two days within the construction period)). However, bottlenose dolphins have a high tolerance to disturbance and often return to areas within a matter of hours. This proportion of bottlenose dolphin disturbed is not expected to reduce the ability of the species to survive, breed or rear their young. The disturbance response is expected to decrease with increasing distance from the Project OAA and given that the CES MU lies approximately 50km away and the Moray Firth SAC is located 150km away, any disturbance is expected to be **Negligible**. Consequently, no long-term decline in the use of the site by bottlenose dolphin is anticipated. Piling activity is expected to be intermittent; therefore bottlenose dolphins have the potential to recover from any disturbance effect in the breaks between activity during the construction stage.

6.1.2.80 Furthermore, the implementation of environmental measures (M-105; see **Table 5.3**) will allow for review of Project impacts post-consent and the implementation of further mitigation for disturbance if required. Therefore, behavioural disturbance from piling is not predicted to result in significant negative effects on individuals or the population associated with the Moray Firth SAC, nor is it expected to result in changes to distribution (CO 2b) or compromise favourable condition (CO 1). It is therefore concluded that the Project alone will not result in any AEoSI in relation to behavioural disturbance from piling during construction or decommissioning, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Unexploded ordnance clearance

6.1.2.81 Explosive sound sources are categorised as ‘impulsive’; however, the number of pulses and overall duration of noise emission which drive the behavioural response are significantly different to piling. Behavioural responses to a single UXO detonation are expected to be a one-off startle response or aversive behaviour; while during pile driving the series of pulses that are emitted are expected to continuously drive animals out the impacted area, enabling a dose-response to be quantified. Therefore, the empirically derived dose-response curves used for assessment of behavioural disturbance for pile driving are not applicable to the assessment of UXO clearance.

6.1.2.82 Due to the lack of empirical studies, there is limited understanding of the effect of disturbance from UXO clearance on marine mammals, meaning that assessments can only provide an indication of the number of animals at risk based on limited evidence. For the purposes of this assessment, TTS-onset has been used as a precautionary proxy for disturbance as per Southall *et al*. (2019; see **Table 6.2**). The TTS-onset ranges have been applied to modelled UXO scenarios, with the maximum design scenario selected based on maximum overlap with the CES MU and proximity to nearshore habitats.

6.1.2.83 The maximum TTS-onset range for bottlenose dolphins (HF cetaceans) under high order UXO clearance (based on a maximum charge of 907kg) is up to 1.6km (unweighted SPL_{peak}). This equates to a maximum of one bottlenose dolphin from the CES MU (and up to 0.41% of the CES MU population) predicted to be affected by high order UXO clearance. Whereas low order detonations (based on a 250g charge) result in predicted TTS-onset ranges of 100m (unweighted SPL_{peak}) and less than 50m. This equates to less than one bottlenose dolphin affected, equating to <0.01% of the CES MU population.

6.1.2.84 These distances are substantially less than the minimum separation between the Moray Firth SAC and the Project OAA and offshore export cable corridor, which is approximately 150km to the OAA and 90km to the offshore export cable corridor at the closest point. The CES MU, considered synonymous with the SAC population, lies approximately 50km from the Project OAA. As such, there is no spatial overlap between the predicted TTS-onset zones and the SAC or MU boundaries, and no individuals within the SAC are expected to be exposed to sound levels exceeding disturbance thresholds. This supports the conclusion that UXO clearance will not result in any disturbance effects on bottlenose dolphins within the Moray Firth SAC.

6.1.2.85 JNCC (2020) guidance states that '*a one-off explosion would probably only elicit a startle response and would not cause widespread or prolonged displacement*'. Each detonation will comprise an instantaneous pulse of noise; therefore, any avoidance behaviour is expected to be short-term and intermittent, with no evidence that such disturbance would alter survival or reproductive rates to the extent that the population trajectory would change.

6.1.2.86 Furthermore, the preferred clearance method is low order detonation, with high order detonation considered a maximum design scenario and used only as a last resort, in line with the UXO Joint Position Statement (UK Government, 2025; Marine Directorate, 2025) and the embedded environmental measures (M-114; see **Table 5.3**). As such, disturbance impacts from UXO are expected to be highly localised and only affect a negligible proportion of the population. Other supporting environmental measures include the MMMP (M-032) and UXO management plan (M-115), all to be implemented in line with the latest guidance and will be updated prior to construction to capture the final refined project parameters.

6.1.2.87 The assessment has determined that a limited proportion of the CES MU population may be disturbed (maximum 0.41%), and should disturbance occur, it would be temporary and recoverable. The commitment to preferred use of low order and the adoption of environmental measures (see **Table 5.3**) will reduce the risk of disturbance further. The small number of bottlenose dolphin disturbed is not expected to reduce the ability of the species to survive, breed or rear their young. It is also possible that UXO clearance will not occur within or near to the CES MU, which would notably reduce the potential for exposure to the Moray Firth SAC population.

6.1.2.88 Given the separation between potential UXO clearance and the Moray Firth SAC, the activity will not contribute to any long-term decline in the use of the site by bottlenose dolphin. Therefore, behavioural disturbance from UXO clearance is not predicted to result in significant negative effects on individuals or the population associated with the Moray Firth SAC, nor is it expected to compromise the distribution of bottlenose dolphins within the SAC (CO 2b) or the site's favourable condition (CO 1).

6.1.2.89 It is therefore concluded that the Project alone will not result in any AEoSI in relation to behavioural disturbance from UXO clearance during construction or decommissioning, and that, subject to natural change, the population of bottlenose dolphins will be maintained in the long-term.

Other construction activities

6.1.2.90 Other construction activities, including trenching, dredging, cable laying, rock placement, drilling, and associated vessel operations, have been assessed using a precautionary 24-hour continuous operation scenario. While these sources are non-impulsive and generate lower-level noise, they may still contribute to temporary behavioural responses.

6.1.2.91 A comprehensive review by the Department for Business, Enterprise and Regulatory Reform (BERR) in collaboration with Department for the Environment, Food and Rural Affairs (Defra) (BERR and Defra, 2008) assessed the potential acoustic impacts of offshore cable installation techniques, including jetting, rock cutting, ploughs, ROVs, and sleds. It concluded that such activities are very unlikely to produce sound levels capable of causing significant behavioural responses in marine mammals.

6.1.2.92 In the absence of specific behavioural disturbance thresholds for the considered non-impulsive sources, TTS-onset ranges have been used as a conservative proxy to indicate the potential extent of disturbance. These ranges were modelled using underwater noise modelling presented in **Volume 3, Appendix 8.1** of the **EIA Report**.

6.1.2.93 Source levels and transmission characteristics were derived using empirical data from Subacoustech Environmental's underwater noise measurement database and scaled to relevant parameters for the Project. For example:

- cable laying typically produces source levels of approximately 171dB re 1 μPa at 1m, with dominant frequencies below 1 kHz;
- trenching, and dredging operations range from 165dB to 186dB re 1μPa at 1m, depending on the method (for example, backhoe or suction);
- rock placement and suction bucket installation may reach higher source levels (up to 192dB re 1μPa at 1m) and generate energy across a broader frequency range; and
- vessel noise is generally continuous and low-frequency, with source levels ranging from 161 to 168dB re 1μPa at 1m, depending on vessel size and speed.

6.1.2.94 Modelled data for other construction activities (for example, cable laying, trenching, dredging, drilling, rock placement) indicate that predicted TTS-onset ranges in bottlenose dolphins were ≤100m for most activities. While the primary assessment assumes a fleeing receptor, which reflects typical bottlenose dolphin behaviour in response to noise, UWN modelling also considered a stationary receptor scenario for completeness. Under this assumption, TTS-onset ranges were slightly higher for certain activities, including suction dredging, rock placement, and suction bucket installation, with predicted ranges extending up to 390m, 410m, and 770m, respectively, for HF cetaceans. However, given the high mobility of bottlenose dolphins and their tendency to avoid uncomfortable acoustic environments, the likelihood of an individual remaining stationary within these zones for a prolonged period is considered highly unrealistic. Given these small spatial range of impact, the proportion of the population which could be impacted is **Negligible**.

6.1.2.95 These distances are substantially less than the minimum separation between the Moray Firth SAC and the Project OAA and offshore export cable corridor, which is approximately 150km to the OAA and 90km to the offshore export cable corridor at the closest point. The CES MU, considered synonymous with the SAC population, lies approximately 50km from the Project OAA. As such, there is no spatial overlap between the predicted TTS-onset zones and the SAC or MU boundaries, and no individuals within the SAC are expected to be exposed to sound levels exceeding disturbance thresholds. This supports the conclusion that other construction activities will not result in any disturbance effects on bottlenose dolphins within the Moray Firth SAC.

6.1.2.96 The nature of the offshore construction activities is that they will occur intermittently throughout the construction period (an approximate twelve-year period). The activities will be mobile, resulting in temporary disturbance of an area that animals can return to once the vessel undertaking the activity has moved location. This limited and intermittent temporal scope further supports the conclusion that any behavioural disturbance will be short-term and reversible.

6.1.2.97 While bottlenose dolphins are not expected to be present across the Project OAA, other construction activities along the Project offshore export cable corridor may intersect with nearshore habitats or movement corridors where presence is more likely, for instance, the CES MU. Due to the highly localised nature of predicted disturbance ranges (≤770m), and the temporary and intermittent nature of the disturbance, bottlenose dolphin are anticipated to recover from any disturbance response without any impact to their ability to survive, breed or rear their young.

6.1.2.98 Given the separation between geophysical surveys and the Moray Firth SAC, the activity will not contribute to any long-term decline in the use of the site by bottlenose dolphin. Therefore, disturbance from other construction activities is not predicted to result in significant negative effects on individuals or the population associated with the Moray Firth SAC, nor is it expected to result in changes to distribution (CO 2b) or compromise favourable condition (CO 1). It is therefore concluded that the Project alone will not result in any AEoSI in relation to behavioural disturbance from non-piling related activities during construction or decommissioning, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Vessel collision risk

6.1.2.99 This Section assesses the potential for vessel movements during construction and decommissioning of the Project, alone, to result in collision risk to bottlenose dolphins associated with the Moray Firth SAC, with reference to the site's COs:

- **CO 1:** To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS; and
- **CO 2a:** The population of bottlenose dolphin is a viable component of the site.

6.1.2.100 While bottlenose dolphins are generally capable of avoiding vessels, a direct strike can result in serious injury or mortality, with the risk of severity increasing with vessel size and speed. Larger vessels (over 80m in length) are associated with the most severe injuries (Laist *et al.,* 2001), whilst faster speeds increase both the likelihood of collision and the potential for lethal outcomes (Schoeman *et al*., 2020).

6.1.2.101 Bottlenose dolphins are agile, fast-moving, and possess acute hearing, enabling detection and avoidance of vessels (Erbe *et al*., 2018; Mills *et al.,* 2023). Most construction vessels are expected to be large and slow-moving or stationary for extended periods. The most frequent movements are likely to involve Crew Transfer Vessels, which are typically smaller and operate at moderate speeds along defined routes. These predictable movements reduce the likelihood of collision (Nowacek *et al.,* 2001; Lusseau, 2003; 2006). Furthermore, such smaller vessels are more manoeuvrable and can avoid marine mammals if detected.

6.1.2.102 Further detail on vessel types, routes, and traffic density in the area surrounding the Project OAA and offshore export cable corridor is described in **Volume 1, Chapter 15: Shipping and Navigation** of the **EIA Report**.

6.1.2.103 Available data from UK stranding programmes (Scottish Marine Animal Stranding Scheme; Cetacean Strandings Investigation Programme, CSIP) indicate that vessel strike is not a significant source of mortality for bottlenose dolphins. In 2022, none of the post-mortem investigations of stranded bottlenose dolphins identified vessel strike as a cause of death (CSIP, 2023; Brownlow *et al*., 2024). However, it is important to note that the strandings data are biased to those carcasses that wash ashore for collection and therefore may not be representative. Furthermore, post-mortems are not undertaken for many carcasses, further reducing the representativity of strandings data.

6.1.2.104 Up to 3,838 vessel movements are anticipated during construction, with a maximum of ten vessels onsite simultaneously. The Project footprint and associated vessel activity are located outside the Moray Firth SAC, with the closest point approximately 90km from the SAC boundary at the offshore export cable corridor. However, there offshore export cable corridor overlaps with the CES MU in which bottlenose dolphin from the SAC may be present, and vessels transiting to and from port may also transit through the CES MU. Therefore, whilst the separation distance with the SAC reduces the likelihood of collision risk to bottlenose dolphin, there is still a potential risk arising from overlap with their functionally linked habitat.

6.1.2.105 Vessel movements will be managed under an Outline VMNSP, which includes management of vessel transit and speed restrictions (M-038; see **Table 5.3**), including adhere to SMWWC for vessel operators. The SMWWC is a statutory code of practice that provides minimum approach distances and protocol for vessel behaviour around marine wildlife. Combined with other best-practice guidance outlined by SNCBs (for example, JNCC and NatureScot), these measures reduce the potential for collision risk.

6.1.2.106 While bottlenose dolphins are not expected to be present across the Project OAA, vessels along the offshore export cable corridor may intersect with nearshore habitats or movement corridors where bottlenose dolphin presence is more likely, for instance, the CES MU. However, the risk of vessel collision to bottlenose dolphin is anticipated to be very low, as this is not a key source of mortality for this species in Scotland. The vessels used for the Project will pose limited collision risk and will also apply embedded environmental measures (see **Table 5.3**) to reduce the risk further. Therefore, vessel collision risk is not predicted to result in any significant negative effects on individuals or the population associated with the Moray Firth SAC, nor is it expected to result in injury (or death) to individuals to an extent that may ultimately affect population viability (CO 2a) or compromise favourable condition (CO 1).

6.1.2.107 It is therefore concluded that the Project alone will not result in any AEoSI in relation to vessel collision during construction or decommissioning, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Vessel disturbance

6.1.2.108 This Section assesses the potential for the Project, alone, to result in behavioural disturbance from the presence of vessels to bottlenose dolphins associated with the Moray Firth SAC during construction and decommissioning. The assessment is undertaken with reference to the following site COs:

- **CO 1:** To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS; and
- **CO 2b:** The distribution of bottlenose dolphin throughout the site is maintained by avoiding significant disturbance.

6.1.2.109 Vessel disturbance may arise from all construction and decommissioning activities that utilise vessels. Vessel disturbance may arise from a combination of underwater vessel noise and the physical presence of the vessel itself (Pirotta *et al*., 2015). However, it is often difficult to attribute the cause of disturbance to one and / or the other definitively. Therefore, disturbance from vessels has been assessed separately from the UWN assessment, covering disturbance driven by both UWN and vessel presence.

6.1.2.110 Vessel presence and movement can cause behavioural responses in cetaceans, including changes in swimming direction, avoidance behaviour, reduced foraging efficiency, and altered social interactions (Nowacek *et al.,* 2001; Lusseau, 2003; Pirotta *et al.,* 2015). Such responses are more likely with repeated or unpredictable vessel approaches, higher speeds, or rapid course changes (Bejder *et al.,* 2006). It has been documented that bottlenose dolphins exhibit sensitivity in their behavioural responses to vessel proximity and density (Lusseau, 2006; Heiler *et al*., 2016).

6.1.2.111 Bottlenose dolphins in the Moray Firth SAC are considered habituated to a degree of background vessel traffic, including commercial shipping, fishing, and recreational boating (Lusseau*,* 2006; Arso Civil *et al.,* 2019). Long-term monitoring has shown stable use of the SAC despite ongoing vessel activity, with over 50% of the east coast population using the SAC annually (Cheney *et al*., 2018). Modelling studies conducted in the Moray Firth SAC have demonstrated that even a sixfold increase in vessel traffic did not result in biologically significant changes to dolphin spatial distribution, social structure, or behavioural time budgets (New *et al*., 2013).

6.1.2.112 In a modelling study by Lusseau *et al.* (2011), it was predicated that increased vessel movements associated with offshore wind development in the Moray Firth did not have a negative effect on the local population of bottlenose dolphins, although it did note that foraging may be disrupted by disturbance from vessels. Bottlenose dolphins can tolerate vessel disturbance, particularly in areas where vessel traffic has always been high (Pirotta *et al*., 2013). Given the area is already busy, an increase in vessel presence would not be a novel feature for bottlenose dolphins in the area (see **Volume 1, Chapter 15: Shipping and Navigation** of the **EIA Report** for further detail).

6.1.2.113 Up to 3,838 vessel movements are anticipated during construction, with a maximum of ten vessels onsite simultaneously. The Project footprint and associated vessel activity are located outside the Moray Firth SAC, with the closest point approximately 90km from the SAC boundary at the offshore export cable corridor. However, there offshore export cable corridor overlaps with the CES MU in which bottlenose dolphin from the SAC may be present, and vessels transiting to and from port may also transit through the CES MU. Therefore, whilst the separation distance with the SAC reduces the likelihood of vessel disturbance to bottlenose dolphin, there is still a potential risk arising from overlap with their functionally linked habitat.

6.1.2.114 While bottlenose dolphins are not expected to be present across the Project OAA, vessels along the offshore export cable corridor may intersect with nearshore habitats or movement corridors where bottlenose dolphin presence is more likely for instance, the CES MU. To note, no vessel disturbance is predicted within the SAC itself given the separation distance between it and the Project OAA and offshore export cable corridor.

6.1.2.115 Whilst bottlenose dolphin in the CES MU may experience disturbance from vessels associated with the Project, it is not expected to have an impact on the local population, and indeed animals in this area will already be exposed to vessel presence. In addition, vessels will also apply embedded environmental measures (see **Table 5.3**; *e.g.,* VMNSP (M-039), SMWWC) to reduce the risk of disturbance further. This plan (M-039) will ensure that vessel traffic moves along predictable routes and will define how vessels should behave in the presence of marine mammals, such as controlling the speed and approach distances to marine mammals. Therefore, vessel disturbance is not predicted to result in any significant negative effects on individuals or the population associated with the Moray Firth SAC, nor is it expected to result in disturbance to an extent that would alter the species' distribution (CO 2b) or compromise favourable condition (CO 1).

6.1.2.116 It is therefore concluded that the Project alone will not result in any AEoSI in relation to vessel disturbance during construction or decommissioning, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Indirect effects on prey

6.1.2.117 This Section assesses the potential for the Project, alone, during the construction and decommissioning stage, to affect bottlenose dolphins associated with the Moray Firth SAC indirectly through changes in the availability, distribution, or quality of their prey. The assessment is undertaken with reference to the following site COs:

- **CO 1:** To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS; and
- **CO 2c:** The supporting habitats and processes relevant to bottlenose dolphin and the availability of prey for bottlenose dolphin are maintained.

6.1.2.118 Bottlenose dolphins in the Moray Firth SAC consume a wide variety of prey species, with salmon, sea trout, cod, herring, mullet, eels and squid identified as important for the Moray Firth population. In the Summer, increased bottlenose dolphin presence has been associated with the seasonal migration of salmonids. However, as generalist feeders, it is likely that they can show dietary flexibility in response to prey availability, which would in turn make them less sensitive to changes in prey species. Full details on key prey species can be found within the baseline section (see **Section 4.1.4**). However, there is potential for indirect effects on bottlenose dolphins resulting from direct effects on fish species or the habitats that support them.

6.1.2.119 Potential pressures on prey species during the construction stage have been assessed in detail with the **EIA Report**, specifically in **Volume 1, Chapter 10: Benthic, Epibenthic and Intertidal Ecology** and **Volume 1, Chapter 13: Fish Ecology** of the **EIA Report**. Relevant impacts include:

- pre-construction seabed preparation, temporary habitat disturbance, and increases in suspended sediment concentrations (SSC) and smothering;
- mortality, injury, and behavioural changes from UWN, vibration, and particle motion (for example, piling and UXO clearance);
- potential indirect effects on prey dynamics;
- release of sediment-bound contaminants, changes in water quality, and collision or entanglement risk; and
- increased risk of introduction or spread of marine invasive non-native species (INNS).

6.1.2.120 The severity and likelihood of these impacts vary depending on species mobility, life stage, and behavioural state at the time of exposure. These factors influence the ability of prey species to avoid or recover from the impact and are considered in the **EIA Report**'s impact evaluations. Most effects are expected to be temporary and spatially limited, with no predicted population-level consequences on prey species relevant to bottlenose dolphins.

6.1.2.121 The **EIA Report** concluded that:

- For **Volume 1, Chapter 10: Benthic, Epibenthic and Intertidal Ecology** of the **EIA Report:** benthic, epibenthic, and intertidal species (some of which are prey for bottlenose dolphins), the magnitude of impact was **negligible** to **medium**, receptor sensitivity was **low** to **medium**, and the significance of effect was **Negligible** to **Minor**, which is **Not Significant** in EIA terms.
- For **Volume 1, Chapter 13: Fish Ecology** of the **EIA Report:** fish species (including key prey species), the magnitude of impact was **very low** to **low**, receptor sensitivity was **low** to **medium**, and the significance of effect was **Negligible** to **Minor**, which is **Not Significant** in EIA terms.

6.1.2.122 Embedded environmental measures will be implemented to minimise indirect effects on prey availability during construction, including the implementation of a Scour Protection Plan (M-028) to manage the design and placement of scour protection and reduce habitat alteration, development and adherence to a Fisheries Mitigation, Monitoring and

Communication Plan (M-048) to minimise potential conflicts with fisheries and avoid indirect effects on prey dynamics, and delivery of the Outline PEMP (M-049; see **Table 5.3**) to monitor benthic and fish communities and enable adaptive management if unexpected effects occur. In addition, piling and UXO clearance protocols within the PEMP, including the use of soft-start procedures, adherence to noise thresholds, and seasonal restrictions where applicable, will be applied to reduce UWN impacts on fish and invertebrate prey species as well as marine mammals.

6.1.2.123 The Project footprint, including the offshore export cable corridor, is located outside the Moray Firth SAC, with the closest point approximately 90km from the SAC boundary. The footprint of potential impacts to prey species will be a maximum of 1,000s of metres (m) (based UWN impacts; **Volume 1, Chapter 13: Fish Ecology** of the **EIA Report**), which is highly unlikely to overlap with the Moray Firth SAC and lead directly to changes in prey in the site. However, there is potential that impacts to prey may occur within the functionally linked habitat of bottlenose dolphin within the CES MU.

6.1.2.124 Fish species of importance to bottlenose dolphins are generally mobile and able to avoid temporary localised disturbance. Available evidence indicates that most displacement from non-impulsive noise is temporary, with fish returning once the disturbance ceases (Popper *et al*., 2014; Hawkins and Popper, 2017) with any short-term displacement is unlikely to cause population-level effects. Seabed disturbance during cable installation is highly localised, and benthic habitats are expected to recover naturally within months to a few years, depending on substrate type (Dernie *et al*., 2003; Boyd *et al*., 2005).

6.1.2.125 While some localised loss or degradation of foraging habitat could occur, alternative feeding areas for bottlenose dolphins are available within the SAC (which will be unimpacted) and in the wider CES MU. Given the generalist feeding habits of bottlenose dolphins, any temporary reduction in availability of specific prey types is unlikely to significantly affect the population. Consequently, no effects on prey are predicted that would adversely affect the prey resource that supports the distribution and population (CO 2c), or favourable condition (CO 1), of bottlenose dolphins associated with the Moray Firth SAC.

6.1.2.126 It is therefore concluded that the Project alone will not result in any AEoSI in relation to indirect effects on prey species during construction or decommissioning, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

6.1.3 Operation and maintenance stage

6.1.3.1 The following sections assess each relevant impact pathway to determine whether the O&M stage of the Project, in isolation, could compromise the achievement of the COs for the bottlenose dolphin in the Moray Firth SAC.

Underwater noise from operational wind turbine generators and cables

6.1.3.2 This Section assesses the potential for UWN generated during the O&M stage of the Project, alone, to affect bottlenose dolphins associated with the Moray Firth SAC. The assessment is undertaken with reference to the following site COs:

- **CO 1:** To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS;
- **CO 2a:** The population of bottlenose dolphin is a viable component of the site; and
- **CO 2b:** The distribution of bottlenose dolphin throughout the site is maintained by avoiding significant disturbance.

6.1.3.3 Operational noise from WTG floating units is primarily generated by mechanical vibrations transmitted through the tower and radiated from submerged components. Due to the smaller submerged radiating area compared to fixed foundations, WTG floating units are expected to produce lower UWN levels and a smaller extent of potential impact (Tougaard *et al*., 2020; Risch *et al*., 2023).

6.1.3.4 Empirical data on operational noise from WTG floating units remain limited. However, measurements from the Hywind demonstrator project in Norway (Martin *et al*., 2011) recorded broadband noise levels of approximately 120dB re 1μPa (SPL_{peak}) at 150m, with no turbine-related components exceeding 110dB re 1μPa. Most of the energy was concentrated below 100Hz, which fall outside the peak hearing sensitivity of bottlenose dolphins. These levels were also found to be comparable to ambient noise from shipping and natural sources, suggesting that operational WTG noise is unlikely to be distinguishable from background conditions at typical exposure distances.

6.1.3.5 To account for the larger WTG floating units for the Project (14-25 Megawatts (MW)), extrapolated estimates using the Tougaard *et al.* (2020) calculator suggest operational noise levels of 131–134dB re 1μPa (SPL_{peak}) at 150m. When compared to the HF cetacean auditory impact thresholds these levels remain well below the thresholds for potential injury (PTS) or TTS in bottlenose dolphins (Southall *et al*., 2019; **Table 6.2**). Even under conservative assumptions, an individual would need to remain within 100m of a WTG for an extended period (for example, more than an hour) to approach the lowest TTS thresholds, which is a highly unlikely scenario given the species' mobility and avoidance behaviour (see **Volume 3, Appendix 8.1** of the **EIA Report** for full details). Therefore, the risk of auditory injury or TTS from operational noise is considered **Negligible**.

6.1.3.6 In addition to turbine-generated noise, floating offshore wind farms may produce underwater sound from mooring and cable systems. Observations from the Hywind demonstrator project (Jasco, 2011) and Hywind Scotland (Burns *et al.,* 2022) identified occasional transient noises such as "snaps," "rattles," and "creaks," associated with strain and friction in mooring lines. These sounds were short-lived (typically <1 second), non-impulsive, and occurred infrequently, less than once per hour on average. The predicted cumulative exposure level from snapping chains was estimated at up to 160dB re 1μPa²s for ten WTGs under maximum design scenario assumptions (Xodus, 2015), which remains below bottlenose dolphin (HF cetacean) auditory injury (PTS) and TTS-onset thresholds defined by Southall *et al.* (2019; see **Table 6.2**).

6.1.3.7 Operational noise generated during the O&M stage will primarily arise from the turbines and cables in the OAA once the Project is commissioned. Available evidence indicates that noise levels associated with operational offshore WTGs are low, typically below thresholds for disturbance of bottlenose dolphin and other cetaceans. Cable burial (or use of appropriate external protection where burial is not practicable) will further minimise the potential for noise emissions by reducing the amount of cable in the water column that could generate noise through movement.

6.1.3.8 Embedded environmental measures, including the Offshore Operations Maintenance Plan (OOMP) (M-122; see **Table 5.4**), set out how potential risks associated with operational activities, including UWN, will be managed during the O&M stage. The Final OOMP will be prepared and submitted to MD-LOT for approval prior to commissioning. In combination with the Cable Burial Risk Assessment (M-054) and cable protection measures (M-057), these measures ensure that operational noise effects on bottlenose dolphin are reduced.

6.1.3.9 The Project OAA is located at considerable distance from the Moray Firth SAC (150km) and around 50km from the CES MU, which is considered synonymous with the SAC population. It is highly unlikely that individuals from the population associated with the Moray Firth SAC would occur within the Project OAA where impact from operational noise from WTGs and cables could arise, given distance to the SAC and the species' strong preference to use the habitat in the CES MU closer to shore. If bottlenose dolphin are present in the OAA, the low frequency, short duration, and infrequent nature of these sounds, means that an impact to bottlenose dolphin is highly unlikely. Therefore, cable and mooring-related noise is not expected to result in any significant negative effects on individuals or the population associated with the Moray Firth SAC, nor is it expected to compromise population viability (CO 2a), result in changes to distribution (CO 2b), or affect the favourable condition of the qualifying feature (CO 1).

6.1.3.10 It is therefore concluded that the Project alone will not result in any AEoSI in relation to UWN impacts from operational noise from WTGs and cables, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Vessel collision risk

6.1.3.11 This Section assesses the potential for vessel movements during O&M of the Project alone to result in collision risk to bottlenose dolphins associated with the Moray Firth SAC, with reference to the site's COs:

- **CO 1:** To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS; and
- **CO 2a:** The population of bottlenose dolphin is a viable component of the site.

6.1.3.12 Given the lower number of vessels estimated for the O&M stage (up to 1,350 round trips, compared to 3,838 during construction), the impact of vessel collision risk during O&M would be similar or lower than that during the construction stage. During the O&M stage, a VMNSP (M-038), Vessel Management and Navigational Safety Plan (M-039) and OOMP (M-122; see **Table 5.4**) will be implemented which further reduce the risk. It is therefore considered that no new risks are anticipated when compared to the assessment of the construction and decommissioning stage. Therefore, the assessment conclusion for this pathway from the construction and decommissioning stage is also applicable to the O&M stage, with respect to CO1 and CO 2a.

6.1.3.13 It is therefore concluded that the Project alone will not result in any AEoSI in relation to vessel collision during the O&M stage, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Vessel disturbance

6.1.3.14 This Section assesses the potential for the Project, alone, to result in behavioural disturbance from the presence of vessels to bottlenose dolphins associated with the Moray Firth SAC during the O&M stage. The assessment is undertaken with reference to the following site COs:

- **CO 1:** To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS; and
- **CO 2b:** The distribution of bottlenose dolphin throughout the site is maintained by avoiding significant disturbance.

6.1.3.15 Given the lower number of vessels estimated for the O&M stage (up to 1,350 round trips, compared to 3,838 during construction), the impact of vessel disturbance during O&M would be similar or lower than that during the construction stage. During the O&M stage, a VMNSP (M-038) and OOMP (M-122; see **Table 5.4**) will be implemented which further reduce the risk. It is therefore considered that no new risks are anticipated when compared to the assessment of the construction and decommissioning stage. Therefore, the assessment conclusion for this pathway from the construction and decommissioning stage is also applicable to the O&M stage, with respect to CO 1 and CO 2b.

6.1.3.16 It is therefore concluded that the Project alone will not result in any AEoSI in relation to vessel disturbance during O&M, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Indirect effects on prey

6.1.3.17 This Section assesses the potential for the Project, alone, during the O&M stage, to affect bottlenose dolphins associated with the Moray Firth SAC indirectly through changes in the availability, distribution, or quality of their prey, with reference to the site's COs:

- **CO 1:** To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS; and
- **CO 2c:** The supporting habitats and processes relevant to bottlenose dolphin and the availability of prey for bottlenose dolphin are maintained.

6.1.3.18 Potential pressures on prey species during the O&M stage have been assessed in detail within the **EIA Report**, specifically in **Volume 1, Chapter 10: Benthic, Epibenthic and Intertidal Ecology** and **Volume 1, Chapter 13: Fish Ecology** of the **EIA Report**. These include:

- habitat disturbance and loss, both temporary and long-term, due to the presence of infrastructure such as offshore substations, scour protection, and cable protection;
- changes to sediment dynamics, including increases in SSC, deposition, and the release of sediment-bound contaminants from seabed disturbance;
- alteration of benthic habitats, through colonisation of hard substrates and potential introduction or spread of marine INNS;
- UWN, vibration, and particle motion, which may cause behavioural changes or displacement in fish and shellfish;
- EMF and heat emissions from array and export cables, which may influence sensitive species;
- changes in water quality and potential contamination, as well as indirect effects from reduced fishing activity within the Project OAA; and
- collision or entanglement risk, particularly for larger or less mobile prey species.

6.1.3.19 The severity and likelihood of these pressures vary depending on species mobility, life stage, and behavioural state at the time of exposure. Most prey species are expected to avoid or recover from temporary disturbance, and no population-level effects are predicted for prey species relevant to bottlenose dolphins.

6.1.3.20 The **EIA Report** concluded that:

- For **Volume 1, Chapter 10: Benthic, Epibenthic and Intertidal Ecology**: benthic, epibenthic, and intertidal species (including some prey species), the magnitude of impact during O&M was assessed as **negligible** to **medium**, receptor sensitivity as **very low** to **medium**, and the significance of effect as **Negligible** to **Minor**, which is **Not Significant** in EIA terms.
- For **Volume 1, Chapter 13: Fish Ecology:** fish species (including key prey species), the magnitude of impact was assessed as **negligible** to **low**, receptor sensitivity as

negligible to **high**, and the significance of effect as **Negligible** to **Minor**, which is **Not Significant** in EIA terms.

6.1.3.21 Embedded environmental measures will be implemented to minimise indirect effects on prey availability during the O&M stage, including the implementation of a Scour Protection Plan (M-028), a Fisheries Management and Mitigation Strategy (M-048), and Outline PEMP (M-049). In addition, the OOMP (M-122; see **Table 5.4**) will ensure that all O&M activities are planned and executed in accordance with best practice, minimising seabed disturbance, noise, and other pressures that could affect prey species.

6.1.3.22 The Project footprint, including the offshore export cable corridor, is located outside the Moray Firth SAC, with the closest point approximately 90km from the SAC boundary. The footprint of potential impacts to prey species will be a maximum of 1,000s of metres (based underwater noise impacts; **Volume 1, Chapter 13: Fish Ecology** of the **EIA Report**), which is highly unlikely to overlap with the Moray Firth SAC and lead directly to changes in prey in the site. However, there is potential that impacts to prey may occur within the functionally linked habitat of bottlenose dolphin within the CES MU.

6.1.3.23 Fish species of importance to bottlenose dolphins are generally mobile and able to avoid localised disturbance. Evidence indicates that any behavioural changes from operational noise or EMF are minor and unlikely to cause population-level effects (Popper *et al*., 2014; Hawkins and Popper, 2017). Furthermore, the introduction of hard substrates may increase local biodiversity and prey availability over time (artificial reef effect).

6.1.3.24 While some localised loss or degradation of foraging habitat could occur due to permanent infrastructure and scour protection, alternative feeding areas for bottlenose dolphins are available within the SAC (which will be unimpacted) and in the wider CES MU. Given the generalist feeding habits of bottlenose dolphins, any temporary reduction in availability of specific prey types is unlikely to significantly affect the population. Consequently, no effects on prey are predicted that would adversely affect the prey resource that supports the distribution and population (CO 2c), or favourable condition (CO 1), of bottlenose dolphins associated with the Moray Firth SAC.

6.1.3.25 It is therefore concluded that the Project alone will not result in any AEoSI in relation to indirect effects on prey species during O&M, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Entanglement with mooring lines and / or secondary entanglement (for example, ‘ghost’ fishing gear)

6.1.3.26 This Section assesses the potential for the Project, alone, to result in entanglement of bottlenose dolphins associated with the Moray Firth SAC during the O&M stage. The assessment is undertaken with reference to the following site COs:

- **CO 1:** To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS; and
- **CO 2a:** The population of bottlenose dolphin is a viable component of the site.

6.1.3.27 The Project comprises a maximum of 1,800 mooring lines across all WTGs, comprising up to eight mooring lines per turbine. Mooring line layouts may include catenary, semi-taut, or taut designs, with chain, synthetic rope, and buoyancy elements, or clump weights, depending on the configuration. The maximum mooring line footprint is approximately 2.011km², with an individual mooring line radius of up to 800m. Additionally, array cables will be installed, with approximately 20% (136km) potentially unburied and exposed on the seabed.

6.1.3.28 Floating offshore WTGs require mooring lines and dynamic cables that move with turbine motion and tidal currents (Garavelli, 2020). These introduce a potential pathway for entanglement either directly, through interaction with mooring lines or cables, or indirectly, through secondary entanglement in derelict fishing gear or other marine debris that may become snagged on moorings (Benjamins *et al*., 2014). The use of taut mooring lines and trenched array cables limits slack in the water column, reducing the likelihood of interaction with mobile marine mammals.

6.1.3.29 Direct entanglement of bottlenose dolphins with mooring lines is considered highly unlikely due to the large diameter of lines (typically >0.1m), their taut configuration, and the species' agility and echolocation abilities, which aid detection and avoidance of in-water structures (Au, 1993; Maxwell *et al*., 2022). To date, there are no recorded cases of odontocete entanglement with offshore wind moorings worldwide (Copping *et al*., 2020).

6.1.3.30 Furthermore, the Project OAA is located approximately 150km from the Moray Firth SAC, and around 50km from the CES MU, which is considered synonymous with the SAC population. Both distances are well beyond the spatial extent where SAC-associated bottlenose dolphins would be expected to encounter mooring infrastructure, significantly reducing the likelihood of exposure.

6.1.3.31 Secondary entanglement through snagged fishing gear represents a more credible pathway of interaction. Entanglement in active or lost fishing gear is a recognised pressure on odontocetes in UK waters (Davison *et al*., 2021; Davison and Doeschate, 2021; Brownlow *et al*., 2024). However, evidence of ghost gear accumulation on mooring systems is sparse and uncertain (Benjamins *et al.,* 2014), and floating offshore wind farms are not currently known to act as significant aggregation points for marine debris.

6.1.3.32 Embedded environmental measures will be implemented to reduce entanglement risk, including the use of taut mooring configurations, cable burial where practicable (OOMP; M-122) and final VMNSP (M-038) to identify and remove any accumulated debris, and substantially reduce the likelihood of entanglement.

6.1.3.33 In summary, there is considered to be negligible likelihood of direct entanglement, and uncertainty over the potential for secondary entanglement of marine mammals, though any potential risk should be reduced through the presence of embedded environmental measures (see **Table 5.4**). The Project OAA is located at considerable distance from the boundary of the SAC; the likelihood of bottlenose dolphin from the SAC being present in the Project OAA is very low. Therefore, no significant entanglement risk to bottlenose dolphins from the Moray Firth SAC is predicted. There is therefore no anticipated change to the viability of the population (CO 2a) or favourable condition (CO 1).

6.1.3.34 It is therefore concluded that the Project alone will not result in any AEoSI in relation to entanglement with mooring lines and / or secondary entanglement during O&M, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

6.1.4 Alone assessment summary for marine mammals

6.1.4.1 This Section summarises the assessment of potential impacts from the Project alone on the bottlenose dolphin qualifying feature of the Moray Firth SAC. The assessment considers each relevant impact pathway identified during screening (see **Section 5.2.1**) and evaluates the potential for AEoSI with reference to the site's COs.

6.1.4.2 **Table 6.4** presents a summary of the assessment with conclusions for each pathways. The assessment draws on Project-specific modelling where available, uses the best available evidence from the literature, and takes account of embedded environmental measures, as outlined in **Sections 6.1.2** and **6.1.3**.

Table 6.4 Summary of AEoSIs for marine mammals (alone)

Designated site	Qualifying feature(s)	Impact pathway	COs	Justification for AEoSI conclusion	AEoSI conclusion
Construction and decommissioning					
Moray Firth SAC	Bottlenose dolphin	UWN (auditory injury).	**CO 1:** To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS. **CO 2a:** The population of bottlenose dolphin is a viable component of the site.	Predicted PTS-onset ranges are highly localised (≤100m for piling and other construction, ≤880m for UXO, ≤36.5m for surveys). No SAC-associated individuals are expected to be within auditory injury range. Frequencies largely fall outside peak sensitivity range. Mitigation (MMMP, EMP, UXO Plan, piling strategy) will be implemented. No risk of injury or population-level effects.	No AEoSI
		UWN (disturbance and displacement).	**CO 1** **CO 2b:** The distribution of bottlenose dolphin throughout the site is maintained by avoiding significant disturbance.	Disturbance is predicted to be temporary, intermittent, and spatially limited across all activities. Modelling shows low numbers of individuals affected (≤5.31% of CES MU for piling; ≤6.64% for UXO). Surveys and other activities generate low-level, non-impulsive noise below behavioural thresholds. Embedded environmental measures (MMMP, EMP, UXO Plan, piling strategy) will be implemented.	No AEoSI

Designated site	Qualifying feature(s)	Impact pathway	COs	Justification for AEoSI conclusion	AEoSI conclusion
				No sustained disturbance or population-level effects predicted.	
		Vessel collision risk.	**CO 1** **CO 2a**	Dolphins are agile and capable of avoiding vessels. Most Project vessels are slow-moving or stationary. Activity occurs outside SAC. VMNSP and SMWWC measures will be implemented. Collision risk is negligible.	No AEoSI
		Vessel disturbance.	**CO 1** **CO 2b**	Project vessels operate outside SAC and follow a VMNSP with speed restrictions and designated routes. Dolphins are habituated to vessel traffic. No significant behavioural disturbance predicted.	No AEoSI
		Indirect impacts on prey.	**CO 1** **CO 2c:** The supporting habitats and processes relevant to bottlenose dolphin and the availability of prey for bottlenose dolphin are maintained.	Potential effects on prey species (for example, from noise, seabed disturbance, SSC) are temporary, localised, and outside SAC. Dolphins are generalist feeders with access to alternative foraging areas. Embedded environmental measures will minimise impacts.	No AEoSI
Operation and maintenance					
Moray Firth SAC	Bottlenose dolphin	UWN (operational WTGs and cables).	**CO 1** **CO 2a**	Operational noise levels are low, below behavioural and injury thresholds, and	No AEoSI

Designated site	Qualifying feature(s)	Impact pathway	COs	Justification for AEoSI conclusion	AEoSI conclusion
			CO 2b	concentrated in frequencies outside dolphin hearing sensitivity. Project OAA is located 150km from SAC. No significant effects predicted.	
		Vessel collision risk.	CO 1 CO 2a	See construction stage assessment. Fewer vessels during O&M and continued implementation of VMNSP. No new risks introduced.	No AEoSI
		Vessel disturbance.	CO 1 CO 2b	See construction stage assessment. Lower vessel activity and predictable maintenance schedules reduce risk. VMNSP remains in place. No new risks introduced.	No AEoSI
		Indirect effects on prey.	CO 1 CO 2c	See construction stage assessment. No measurable impact on prey or supporting habitats during O&M.	No AEoSI
		Entanglement with mooring lines and / or secondary entanglement.	CO 1 CO 2a	Direct entanglement is highly unlikely due to mooring design and distance from SAC. Secondary entanglement risk is low and mitigated through environmental measures (for example, taut lines, debris removal).	No AEoSI

6.2 Offshore ornithology

6.2.1 Approach to assessment

6.2.1.1 This Section provides information to determine whether it is possible to exclude adverse effects on integrity from the Project on the qualifying features of designated sites (SPAs and Ramsars) screened into the AA. This Section in particular focuses on 'offshore' ornithology, which refers to potential effects within the offshore environment beyond MHWS on ornithology features.

6.2.1.2 For each designated site, a site description is provided. Depending on the information available, this may include its conservation objectives, supplementary advice on the conservation objectives, conservation advice, site condition monitoring or other baseline resources.

6.2.1.3 To reduce repetition of assessments, where appropriate, consideration of qualitative assessments have been presented together as a generic text for all designated sites and features for identified potential impact pathways and Project stages (as opposed to repeating the assessments in each individual case). This includes consideration of secondary entanglement and migratory collision risk. Similarly, for more distant sites, where the level of connectivity can be considered relatively weak, as evidenced through the level of predicted impact apportioned to the designated site, assessments have been presented on a per receptor basis for all relevant designated sites.

6.2.1.4 For quantitative assessments, key evidence bases, assessment limitations and impact predictions prior to apportionment to individual designated sites is provided in **Section 6.2.4** and **Section 6.2.5** for distributional responses and collision risk, respectively.

6.2.2 Updates to stakeholder issues since screening

6.2.2.1 Since completion of Screening (results presented within **Appendix A**) for the Project, a number of revisions to conclusions have been made following consultation feedback (see **Section 3.6**). These revisions are as follows:

- No LSE concluded for collision risk for the herring gull feature for all designated sites based on advice from NatureScot**.** This is due to the OAA being outwith of the mean max plus one SD foraging range for all designated sites and the request for a regional assessment during the non-breeding season.
- LSE concluded for the kittiwake feature of St Abb's Head to Fast Castle SPA in relation to distributional response effects and collision risk (**Section 6.2.21**).
- LSE concluded for the great skua feature of St Kilda SPA in relation to collision risk (**Section 6.2.19**).
- LSE concluded for the gannet feature of Sule Skerry and Sule Stack SPA in relation to distributional response effects and collision risk.
- LSE concluded for the gannet feature of North Rona and Sula Sgeir SPA in relation to distributional response effects and collision risk.
- LSE concluded for all fulmar features identified as having connectivity at screening stage in relation to distributional response effects.
- LSE concluded for all storm petrel, Leach's storm petrel and Manx shearwater features identified as having connectivity at screening stage in relation to the potential for light pollution to lead distributional response effects and collision risk (**Section 6.2.18**).

6.2.3 Apportionment of impacts to designated sites

Apportionment process summary

6.2.3.1 Due to there being multiple designated sites identified through screening as having theoretical connectivity to the Project, an apportionment process has been undertaken to understand the level of potential impact posed by the Project for each qualifying feature of designated sites screened in for assessment.

6.2.3.2 The level of potential connectivity between the Project and the qualifying features of designated sites may vary seasonally, therefore apportionment has been undertaken on a seasonal basis, in accordance with NatureScot Guidance Note 9 (NatureScot, 2020a), where necessary. The approach to HRA apportionment was discussed and agreed during consultation with NatureScot, as summarised in **Section 3.6**. Further detail on the approach to HRA apportionment applied for the Project and proportional impact splits for each designated site qualifying feature, is provided in **Appendix C**. The results of HRA apportionment are summarised within the 'Qualifying features Requiring Assessment' section for each detailed designated site assessment undertaken.

Seasonal definitions for assessment

6.2.3.3 Seasonal definitions for relevant qualifying features potentially impacted by the Project are summarised in **Table 6.5**, based on recommended seasonality provided within NatureScot Guidance Note 9 (NatureScot, 2020a). Such seasonal definitions are not site-specific to the Project and therefore the appropriateness of such definitions to characterise the Project has been appraised for key species within the **Volume 3, Appendix 12.1** of the **EIA Report**.

Table 6.5 Seasonal definitions for key offshore ornithological features

Species	Breeding season	Non-breeding season
Great skua	Mid-April to mid-September.	Mid-September to mid-April.
Great black-backed gull	April to August.	September to March.
Kittiwake	Mid-April to August.	September to mid-April.
Guillemot	April to mid-August.	Mid-August to March.
Razorbill	April to mid-August.	Mid-August to March.
Puffin	April to mid-August.	Mid-August to March.
Gannet	Mid-March to September.	October to mid-March.

Reference populations for assessment

6.2.3.4 To understand potential population consequences, the percentage point change in survival rates resulting from the level of predicted impacts apportioned to individual qualifying features of designated sites have been calculated. The percentage point changes in survival rate has been calculated where available for the most contemporaneous colony count to the DAS surveys and latest colony count. The best available dataset for deriving contemporaneous colony counts was concluded as the seabirds counts (Burnell *et al.* 2023), as recommended by NatureScot (**Table 3.1**). Assessments have also been undertaken against the latest available colony count available, which was primarily sourced from the SMP database (SMP, 2025). If an alternative source was used for deriving the latest count this is clearly signposted within the report.

6.2.3.5 Undertaking assessments against the most contemporaneous and latest colony count allows for contextualisation of the potential impact of HPAI on qualifying features of designated sites.

6.2.4 Distributional responses

Overview

6.2.4.1 The presence of wind turbines has the potential to directly disturb and displace seabirds within and around the area of sea where the Project is proposed to be developed. This potentially reduces the area available to forage, loaf and / or moult. Such distributional responses to the presence of the Project may contribute to individual birds experiencing fitness consequences, which at an extreme level could lead to the mortality of individuals.

6.2.4.2 Seabirds vary in their response to the presence of anthropogenic structures such as offshore wind farms. Despite offshore wind farms being a relatively new feature within the marine environment, the potential distributional responses can be inferred from available post-consent monitoring from operational offshore wind farms.

6.2.4.3 To inform the recommended approach to assessment of distributional responses in Scottish waters, NatureScot have produced a guidance note (NatureScot, 2023f) providing advice on how to consider, assess and present information and potential consequences of seabird distributional responses to offshore wind farms. This guidance note has shaped the assessment provided below.

6.2.4.4 As determined from HRA screening, the following seabird qualifying features are concluded as requiring quantitative assessment of distributional responses from the Project based on theoretical connectivity to known designated sites, species sensitivity to distributional response effects and known presence within the Project:

- kittiwake;
- guillemot;
- razorbill;
- puffin; and
- gannet.

6.2.4.5 For the above species a quantitative assessment has been undertaken following the matrix approach only described within NatureScot Guidance Note 8 (NatureScot, 2023f). Although SeaBORD could also be used to inform distributional response effects for kittiwake and auk species, due to the model currently undergoing updates it was agreed via consultation with NatureScot that such modelling wasn't required for the Project (see consultation and engagement within **Volume 1, Chapter 12 Offshore and Intertidal Ornithology** of the **EIA Report**).

6.2.4.6 Additionally, as noted within **Section 3.6**, at the request of NatureScot fulmar has also been considered for assessment of distributional responses, though due to data limitations this species has been assessed on a qualitative basis only for all designated sites combined.

6.2.4.7 For each of the six species screened in for assessment, a review was undertaken of evidence from the literature on potential disturbance levels and distributional response effects from offshore wind farms. These reviews have been used to inform the 'Developer' approach and the appropriateness of recommendations within NatureScot's Guidance Note 8 (NatureScot, 2023f), which has been used to inform the 'Guidance' approach to assessment.

Kittiwake distributional responses evidence base

6.2.4.8 The current UK SNCBs guidance on the requirements for displacement assessment (SNCBs, updated 2022), does not consider kittiwake to be a priority species as the species falls below the SNCBs recommended threshold for assessment relating to both 'disturbance susceptibility' and 'habitat specialisation'. The SNCB guidance also provides additional context as to why kittiwake (gull species) were concluded as being below the threshold for disturbance and displacement susceptibility (SNCBs, 2022):

6.2.4.9 *"It is recognised that, regardless of these scores, it is unlikely that cormorant and gull species will need to be routinely assessed for displacement, as a number of empirical studies have demonstrated these species can also be attracted as well as display no noticeable reaction to the presence of OWFs (e.g. Leopold et al. 2013; Vanermen et al. 2015; Petersen et al. 2006; Mendel et al. 2014)".*

6.2.4.10 Reviews of displacement and disturbance studies by Furness *et al.* (2013), extended by Bradbury *et al.* (2014) and updated by Wade *et al.* (2016) allowed for the 'disturbance susceptibility' scores to be derived. Therefore, at the time of issue in 2017 the Joint SNCBs Interim Displacement Advice Note was based on the best available scientific evidence.

6.2.4.11 Dierschke *et al.* (2016) completed a comprehensive review on seabird avoidance and attraction to offshore wind farms based on behavioural responses of kittiwakes from 11 offshore wind farms. Mean scores were variable, with one account of strong attraction (increase of >80%), one account of weak attraction (increase of >50%), five accounts of no windfarm effect, one account of weak avoidance, one account of strong avoidance (decrease>80%) and two accounts of macro avoidance behaviour. The two accounts of macro avoidance at Horns Rev 1 and 2 were based on just 11 tracks (Skov *et al.* 2012) and in previous studies on distributional responses at the two sites no significant effects were reported and kittiwake were observed roosting on the jacket foundations (Skov *et al.* 2018; Peterson *et al.* 2012). The account of strong avoidance was from studies at Thornton Bank which suggest a displacement rate of 70%, however at the neighbouring Bligh Bank site displacement was not observed for kittiwake (Vanermen *et al.* 2016). Further uncertainty as to the distributional response being a wind farm effect is drawn from only one model showing a statistically significant effect, the buffer area showing a significant attraction effect and 1% of the kittiwakes recorded in the studies observed roosting on turbines at Thornton Bank (Vanermen and Steinen, 2019). Therefore, the high distributional response reported by one statistical model may not be genuine nor can it be attributed with high confidence to the presence of the wind farm. The concluding remark from the authors was, '*due to inconsistency between the significance levels of the MMI and full model OWF coefficients, the results for black-legged kittiwake should yet be regarded as inconclusive*' (Vanermen *et al.* 2019). The Dierschke review classified kittiwake a 'species which are hardly affected by offshore wind farms or with attraction and avoidance approximately equal over all studies'.

6.2.4.12 For all assessments in the UK, with the exception of Scotland, recommendations in the Joint SNCBs Displacement Advice Note (SNCBs, 2022) are followed and so kittiwakes have not been assessed for disturbance and displacement in EIAs. An exception to this was made for kittiwake displacement assessment for Mona and Morgan offshore wind farms however this was made against the relevant representation recommendation; '*We do not consider this an accurate reflection of the EWG advice. Natural England and NRW advised that displacement was not assessed for kittiwake. Therefore Natural England will not review or consider the findings of the displacement assessment for kittiwake'* (Morgan Offshore Wind Ltd, 2024).

6.2.4.13 The requirement for Scottish offshore wind farm projects to assess kittiwakes for distributional responses originated with the Seagreen Phase 1 offshore project application and the opinion provided by Scottish Ministers for the EIA Report (MD-LOT, 2017). Scottish Ministers stated that displacement assessments should be carried out for kittiwakes using a 30% displacement rate in the breeding season and for a qualitative assessment to be completed for the non-breeding season. NatureScot advised that '*There was no need to include kittiwake, the data available from post construction monitoring indicate no significant avoidance behaviour by this species*'. However, RSPB recommended a 50% displacement rate for kittiwake and so the Marine Directorate – Science Evidence, Data and Digital (MD-SEDD) advised that displacement should be included in kittiwake impact assessments as macro avoidance / displacement has been observed at some wind farms and a 30% displacement rate was recommended (MD-LOT, 2017).

6.2.4.14 The advice provided to the Seagreen offshore project regarding kittiwake displacement assessment was then taken through for Inch Cape, Neart na Gaoithe, Moray West and Pentland Floating Offshore Windfarm. The current ScotWind and INTOG round of east coast Scotland offshore wind applications (Green Volt, Berwick Bank, Salamander and Ossian) have all received the same scoping opinion for kittiwake displacement assessments. However, in all cases, the Applicant's position has been that the approach is highly precautionary considering the lack of empirical evidence supporting a 30% displacement rate (Green Volt, 2023; Berwick Bank, 2023, Salamander, 2024; Ossian, 2024, Cenos, 2024, Caledonia, 2024).

6.2.4.15 A series of published guidance notes were collated in January 2023 for NatureScot's advice on marine renewables development, which 'sets out NatureScot's recommendations for good practice in the impact assessments for Scottish casework'. Guidance Note 8 (NatureScot, 2023f) which relates to assessment of distributional response effects recommends a displacement rate of 30% for the impact assessments for kittiwake. This advice on kittiwake displacement is therefore no longer aligned with the advice given in the Joint SNCBs Interim Displacement Advice Note (2022). Although the guidance note refers to exceptions to advice in instances where strong empirical evidence suggests conclusions of the original sensitivity scores may be incorrect and that displacement rates may be updated when new evidence is available. The rationale for the proposed displacement rate used to inform the selection of the recommended displacement rate is unclear in Guidance Note 8. Therefore, any new studies that have been published since the issue of the Joint SNCBs Interim Displacement Advice Note (SNCBs, 2022) have been reviewed in the section below to determine whether new evidence is available to support the advised 30% rate for kittiwake displacement assessment.

6.2.4.16 Four studies on displacement effects on kittiwake have been completed since the Dierschke *et al.* (2016) review (APEM, 2017; Percival and Ford, 2017; Peschko *et al.* 2020 and Trinder *et al.* 2024) in addition to a series of tracking studies of kittiwakes from the east coast of Scotland (Pollock *et al.* 2023; O'Hanlon *et al.* 2024 and Johnston *et al.* 2024) and an updated review on post-construction displacement and attraction of marine birds (Lamb *et al.* 2024). Outcomes of these studies are as follows:

- Post-construction monitoring of the operational Westermost Rough Offshore Wind Farm found no evidence of avoidance from kittiwakes towards the offshore wind farm (APEM, 2017).
- Pre-, post- and construction stage monitoring of Westermost Rough Offshore Wind Farm found no statistically significant differences within the wind farm compared to pre-construction (Percival and Ford, 2017).
- Peschko *et al.* (2020) completed a study on kittiwake distributional responses at four offshore wind farms in the German North Sea. They described that distributional responses were statistically significant. However, there are concerns about the validity of the results and how genuine the displacement described is wind farm related.
- Firstly, the reported effect is only detected from data that covers the second week of May to mid-July referred to in the study as the 'breeding season'. The analysis of the data that covered the period from late February to early May referred to in the study as the 'Spring' did not show any statistically significant displacement effects. The reasoning for this split in the data is unclear as the non-migratory breeding season for kittiwakes is usually defined as 01 May to 31 July and March and April are still considered the breeding season, as kittiwake attend the colony during this period establishing territories and building nests. Therefore, kittiwakes would be foraging from the colony in a similar manner as during May to July.
- Secondly, none of the natural covariates had an effect on kittiwake densities in the breeding season. This would reduce the confidence of the predicted densities across the study area and whether apparent changes in densities between Project stages are genuine. This is also reflected in the large CIs presented of -65% to -15% around the reported displacement effect of -45%. Indeed, the density distribution within the study area is not similar between the before and after Project stages suggesting other factors are driving distributional changes other than the presence of the offshore wind farms in the 'Spring' period. Thirdly, survey effort was much higher within the offshore wind farm area and buffer areas than the wider study area used as a control although the study does not account for this. Fourthly, the displacement effect is from the combined response of all four offshore wind farms in the study and therefore it is unclear whether the distributional response applies equally at each offshore wind farm in the study. These concerns raise reasonable doubt as to whether the results are reproducible if the data underwent independent re-analysis.
- Post-construction monitoring of Beatrice Offshore Wind Farm in 2019 and 2021 breeding seasons indicated a significant redistribution of kittiwake with increases in parts of the wind farm for year 1 of monitoring (MacArthur Green, 2021 and 2023). However, in Year 2 there were no significant responses to distribution within the wind farm array (MacArthur Green, 2023). Overall, the peer-reviewed results describe no evidence of displacement by kittiwakes (Trinder *et al.* 2024).

6.2.4.17 Tracking studies have also provided valuable information on kittiwake movements in proximity to offshore wind farms:

- Kittiwakes tagged at Buchan Ness to Collieston Coast SPA in the breeding season (late June to early August) indicated that 75% of tagged birds spent time within the OAA of the offshore wind farm, with up to 18% of flight time spent in the array (O'Hanlon *et al.* 2024). A repetition of this study was completed in 2023 and found similar results (Johnston *et al.* 2024).
- Data from O'Hanlon *et al.* (2024) was also used in a study by Pollock *et al.* (2023), investigating behavioural responses of kittiwakes within foraging range of an offshore wind farm. As highlighted in the O'Hanlon *et al.* (2024) study, behaviours of kittiwakes

are complex and variable responses were exhibited. In most cases there was attraction to the offshore wind farm sites, however this was not deemed as statistically significant.

6.2.4.18 The evidence above would suggest there is no strong empirical evidence to support the opinion that kittiwake is a species with significant susceptibility to distributional response effects and there is currently no evidence of displacement effects in the literature reported for the non-breeding season. However, distributional responses impacts have been assessed as requested within NatureScot's Guidance Note 8 (NatureScot, 2023f) on a precautionary basis using the displacement and mortality rates recommended.

Auk species distributional responses evidence base

6.2.4.19 Displacement impacts from offshore wind farm post-consent monitoring studies were first reviewed by Dierschke *et al.* (2016). The review concluded that the most common response, to the presence of turbines, for auks was 'weak displacement' but with a few exceptions such as for the Dutch and Belgium offshore wind farms which suggested displacement rates of 60% to 75%. However, auk abundance within these studies tends to be low and re-analyses of the data using INLA suggested displacement effects could be lower than 50% or shown to be not statistically significant (Zuur, 2018; Vanermen and Steinen ,2019). There have been further displacement studies on auks (APEM, 2017; Webb *et al.* 2017; Vanermen *et al.* 2019; Peschko *et al.* 2020; MacArthur Green, 2021; Peschko *et al.* 2024) which have been summarised as part of a more recent comprehensive review on auk displacement responses to offshore wind farms (APEM, 2022).

6.2.4.20 APEM (2022a) provides an extensive analysis of empirical data from multiple offshore wind farms expanding and updating the review by Dierschke *et al.* (2016). The review concluded that auk displacement varied considerably between study sites showing attraction, no significant effect, or a displacement effect. For example, the studies on guillemot included: one offshore wind farm with positive displacement effects, eight offshore wind farms with no significant effects or weak displacement effects, three with inferred displacement effects (but not statistically tested), and eight with negative displacement effects. The displacement effects from those studies which provided a defined displacement rate ranged from +112% to -75%. The number of studies on razorbill are considerably less but show a similar range of displacement responses from three studies suggesting no significant effects and three studies indicating a displacement rate which range from 30% to 80%. For puffin there has been little empirical studies of displacement rates for offshore wind farms. In the review by Dierschke *et al.* (2016) a response class for displacement was not allocated to this species due to lack of data. However, disturbance susceptibility for puffin have been estimated to be less than guillemot and razorbill (Bradbury *et al.* 2014) therefore in the absence of species-specific displacement rates for puffin, rates used for guillemot and razorbill would be reasonable. Although displacement rates of 50% or more were concluded for some of these studies these were only observed in the non-breeding season. Review of the analysis methods and quality of the datasets for these studies, found that some studies have not utilised the most appropriate statistical modelling methods for the data collected. These studies were coincidentally found to have high displacement rates due to low abundance and high numbers of zero counts, making displacement rate prediction highly problematic given natural spatial and temporal variation in auk abundance and distribution. As such, the displacement effects reported in these studies are most likely over precautionary. The conclusion from the APEM (2022a) literature review suggested that a displacement rate of up to 50% for the OAA and 2km buffer would be the most evidence-based approach for UK offshore wind farms, whilst still being suitably precautionary for assessment. Lamb *et al.* 2024 conducted a meta-analysis to assess the likelihood of detecting a response from seabirds to offshore wind farms. The analysis concluded that the presence and rate of distributional change reported in studies was dependent on study design criteria and wind farm characteristics, suggesting displacement rates are likely to be site specific.

6.2.4.21 Further evidence that an auk displacement rate of 50% is precautionary comes from studies that indicate auk habituation to offshore wind farms. This was recently demonstrated at Thanet offshore wind farm, where auk displacement was shown to be statistically significant, but only in the short term, with abundances increasing within the wind farm from year two post-construction suggesting some level of habituation after one year of operation. Indeed, year two and three displacement rates for auks fell from a range of 75% to 85% in the first year of operation to a low of 31% to 41% within year two and three of operations (Royal HaskoningDHV, 2013). There is also further emerging evidence as additional post-construction monitoring of offshore wind farms continues, with reports of auk numbers increasing and observations of foraging behaviour within the wind farm itself (Leopold and Verdaat, 2018). This includes evidence of habituation within offshore wind farms of the Belgium wind farm concession zone which previously concluded displacement rates of over 70%, now reporting higher numbers within the wind farm than outside (Degraer *et al.* 2021). This would suggest that displacement rates are expected to diminish over the operational life of offshore wind farms.

6.2.4.22 The most recent evidence in relation to auk behavioural responses to offshore wind farms in the UK comes from the post-construction monitoring of Beatrice Offshore Wind Farm, which indicated higher abundances of guillemot and razorbill within the Beatrice Offshore Wind Farm compared to pre-construction surveys (MacArthur Green, 2021). Specifically, results indicated that there were significant increases in overall auk abundance following post-construction. Results from the second year of post-consent monitoring suggested no indication of avoidance of the offshore wind farm or individual turbines and in some cases higher densities of auks were recorded in proximity to turbines (MacArthur Green, 2023). Overall, it was concluded that no displacement effects on auks were detected from the two years of post-consent monitoring for the Beatrice Offshore Wind Farm (Trinder *et al.* 2024).

6.2.4.23 The only studies that demonstrate significant and robust displacement effects are reported for offshore wind farms in the German North Sea. Peschko *et al.* (2020), reported displacement effects of 44% in the breeding season, although with a 95% CI of 8 to 66% suggesting considerable uncertainty. Later studies on displacement effects during the non-breeding season reported that only during the post breeding migration did displacement within the offshore wind farm and response radius reach 79%. For the winter period the displacement effect was reported at 51% within the offshore wind farm and response radius (Peschko *et al.* 2024). However, as Lamb *et al.* (2024) concluded, reported displacement responses are likely to be site specific especially between different wind farm designs and distant geographical locations.

6.2.4.24 Therefore, in conclusion, there is strong evidence to support the Developer approach auk displacement rate of 50% within offshore wind farm sites and out to a 2km buffer. This would be considered precautionary as displacement effects of 50% or higher have not been concluded in the breeding season in any study and significant displacement effects of 70% or higher have only been concluded during autumn passage and only within one study area outside UK waters that see large numbers of guillemot pass through this area (Peschko *et al.* 2024). This does not align with the guidance approach that suggests the use of up to 60% displacement for all seasons (NatureScot, 2025a). Both approaches will be provided in the impact assessments for all three auk species.

6.2.4.25 In relation to mortality rates, current evidence suggests that the response of seabirds to offshore wind farms varies depending on the species and life stage of the individual birds. The levels both spatially and temporally to which birds may avoid offshore wind farms are likely to be based on key factors such as competition levels within the wider area and prey abundance within the offshore wind farm. The consequence of such avoidance may result in reduced foraging areas available to individuals. Mortalities are likely to correlate strongly with the quality of the area within the offshore wind farm that some individuals are displaced from but conversely may offer increased foraging efficiency for those still entering the offshore wind farm area. If the offshore wind farm area is considered to be a key foraging area and the area outside of the offshore wind farm is close to carrying capacity, then higher mortality rates may theoretically occur (Busche and Garthe, 2016; SNCBs, 2022). Conversely, if birds are being displaced into an area of optimal habitat and closer to breeding colonies, then this could result in a positive impact due to species having a reduction in energy expenditure foraging (Searle *et al.* 2020).

6.2.4.26 For auk species, NatureScot's Guidance Note 8 (NatureScot, 2023f) recommends a mortality rate of 3% to 5% during the breeding season and 1% to 3% during the non-breeding season. The appropriateness of using mortality rates as high as 5% is unclear given the limited evidence. There have been two detailed studies that modelled the predicted consequence of displaced seabirds using individual based models (IBMs), including auks, from offshore wind farms (Searle *et al.* 2014 and 2018; and van Kooten *et al.* 2019). IBMs incorporate biological parameters such as wind farm location in relation to relevant seabird colonies, seabird utilisation density maps energetic requirements and prey distributions to model a more evidence-based fate of displaced birds.

6.2.4.27 Van Kooten *et al.* (2019) determined the cost of birds avoiding areas based on energy-budget models for two scenarios; using habitat utilisation maps and a fixed 10% mortality rate. The results demonstrated that an additional 1% mortality for displaced auks is a more appropriate evidenced-based rate, in comparison to the overly precautionary 10% mortality rate.

6.2.4.28 Searle *et al.* (2014; 2018) assessed the effects displacement and barrier effects have on breeding seabirds. The study was based on time and energy budget models being created to estimate the displacement impacts on the breeding population of seabirds, including auks during the chick rearing period. The models provided evidence that displacement has the potential to impact on future survival prospects of an auk due to changes in time and energy budgets. The model simulations consistently yielded estimated offshore wind farm project alone effects that corresponded to additional declines in SPA adult survival of less than 1% for auks.

6.2.4.29 A key factor determining the effects of displacement is the importance of the OAA (such as prey abundance) in the context of the surrounding area. However, offshore wind farm site selection process avoids areas of known high density usage by seabirds reducing impacts from potential displacement. This assumes that areas of higher prey availability are available within foraging distance outside the OAA for displaced birds. Based on the best available evidence from the IBM simulation studies, it is suggested that mortality rates for displaced birds are considerably less than 5%. Indeed, Searle *et al.* (2020) demonstrated that modelled estimates of additional mortality at SPAs to combined offshore wind farm footprint displacement can be lower than 1%.

6.2.4.30 Further anecdotal evidence of negligible additional mortality rates as a consequence of displacement comes from the post consent monitoring of the Helgoland auk colony in the German North Sea. Offshore wind farms have been in operation in the area since 2014 and a displacement rate for auks was reported of 44 and 63% in the breeding season and spring periods, respectively (Peschko *et al.* 2020). The offshore wind farms have therefore been in operation long enough for any correlations between colony demographics and operation of the offshore wind farm to be identified. The latest breeding population status on Helgoland shows a continued increase for both razorbill and guillemot over the latest five-year period, which has remained unchanged compared to long-term data (Gerlach *et al.* 2019), supporting an inferred conclusion that high mortality rates due to displacement are not occurring at the colony.

6.2.4.31 Therefore, a matrix approach using a broad range of mortality rates can be refined using estimations based on available evidence from IBM studies (Van Kooten *et al.* (2019); Searle *et al.* (2014; 2018; 2023), which suggest additional mortality rates for displaced seabirds are unlikely to exceed 1% for SPA birds especially at the limit of their foraging range and given that offshore wind farm site selection avoids areas preferred and utilised by seabirds. Therefore, based on best available evidence from IBM studies the Developer approach considers a mortality rate of up to 1% to be sufficiently precautionary for assessment of consequential displacement mortality. This is different to the approach recommended within NatureScot's Guidance Note 8 (NatureScot, 2023f) that recommends the use of up to a 5% mortality rate. Both approaches will be provided in the impact assessments for all three auk species.

Gannet distributional responses evidence base

6.2.4.32 Gannets show a low level of sensitivity to ship and helicopter traffic (Garthe and Hüppop, 2004; Furness and Wade, 2012). A study by Krijgsveld *et al.* (2011) using radar and visual observations to monitor the post-construction effects of the Offshore Wind Farm Egmond aan Zee (OWEZ) established that 64% of gannets avoided entering the wind farm (macro-avoidance). The results of the post-consent monitoring surveys for Thanet Offshore Wind Farm found that gannet densities reduced within the site in the third year, but the report did not quantify this (Royal HaskoningDHV, 2013). Evidence from a recent review undertaken by APEM (2022b), which has collated and critically appraised studies from 25 offshore wind farms, suggests that gannet behavioural response to offshore wind farms varies seasonally with data suggesting displacement rates of 40% to 60% during the breeding season and 60% to 80% during the non-breeding season.

6.2.4.33 More recent studies in relation to gannet responses to offshore wind farms comes from the Beatrice Offshore Wind Farm post-construction monitoring data, which suggested displacement rates, although not quantified directly, in the upper range described above for the breeding season (MacArthur Green, 2021 and 2023), as only 12 gannets were recorded within the offshore wind farm during 2021.

6.2.4.34 Therefore, for the purpose of this assessment, the Developer approach utilises a displacement rate of 60% to 80%, to account for the potential variability noted above. This is presented alongside the guidance approach which recommends using a 70% displacement rate (NatureScot, 2025a).

6.2.4.35 NatureScot's guidance is to present and consider assessing displacement impacts using a mortality rate of up to 3% (NatureScot, 2025a) the appropriateness of using mortality rates as high as 3% is unclear given the limited evidence. A mortality rate of 1% was selected for the Developer approach, based on expert judgement supported by the evidence that suggests that gannet have a large mean max (315km) and maximum (709km) foraging range during the breeding season (Woodward *et al.* 2019) and during the non-breeding season can travel 200km to 400km per day (Garthe *et al.* 2007). Gannet can switch to different prey depending on availability, feeding on a variety of different prey items including mackerel (*Scomber scombrus*), sandeels (*Ammodytes sp.*), immature herring (*Clupea harengus*) and sprat (*Sprattus sprattus*) (Forrester *et al.* 2007; Hamer *et al.* 2007) which provide sufficient alternative foraging opportunities despite any potential reduced foraging within the OAA. Therefore, despite the displacement responses likely by gannets to offshore wind farms, it is highlighted that any potential consequences of displacement would likely be minimal for gannet due to their large foraging range, their diverse diet and the low energy costs associated with the additional flight distances incurred.

6.2.4.36 For the purpose of this assessment, the Developer approach is focussed on a displacement rate of 60% to 80% and mortality rate of 1% for each season based on evaluation of the preceding evidence bases. Additional consideration is provided by reference to the guidance approach assessing potential impacts using 70% displacement rate and a mortality rate of 1% to 3% (NatureScot, 2025a).

Predicted Project abundance and consequent distributional effects

6.2.4.37 As described within **Volume 3, Appendix 12.1** and **Volume 3, Appendix 12.5** of the **EIA Report**, two methods of abundance estimation have been completed for the Project based on the 24 months of site-specific DAS collected.

6.2.4.38 To ensure the most appropriate dataset were utilised for assessment, the design-based vs model-based datasets were interrogated. Model-based abundance estimates were used where a complete season of results was available. Design-based abundance estimates were selected where a full season of model-based abundances were not available or where they were deemed unsuitable. This resulted in the use of model-based abundances for the kittiwake and gannet breeding seasons alone and the use of design-based for all other seasons and species (guillemot, razorbill and puffin).

6.2.4.39 Although the model-based abundances were fully available for guillemot, they were deemed unsuitable due to the significant difference from the design-based estimates. The apportioned and availability bias corrected estimates derived from MRSea modelling were consistently lower suggesting these results maybe underestimations. Over half of the model-based confidence intervals showed no overlap with the design-based confidence intervals showing a persistent divergence in results.

6.2.4.40 The primary method of distributional response assessment will be based on the matrix approach as agreed through consultation with NatureScot (See consultation and engagement within **Volume 1, Chapter 12: Offshore and Intertidal Ornithology** of the **EIA Report**). In accordance with the matrix approach, displacement matrices are provided for the key assessments on an annual basis.

6.2.4.41 For the five species screened in for a quantitative assessment of distributional response effects, the assessment focuses on the mean seasonal peak abundance of both flying and sitting birds for the Project OAA plus a 2km buffer as provided in **Table 6.6** The operational and maintenance phase predicted consequent displacement mortality when considering both the Developer and guidance approach is also provided in **Table 6.6** prior to apportionment to individual designated sites and features. Apportioning rates and consequent displacement mortality is provided for each respective designated site qualifying feature screened in for assessment.

6.2.4.42 Confidence limits around the mean peak abundances have been apportioned to designated sites and qualifying features taken through for distributional response assessment. These are provided in **Appendix C**.

Table 6.6 Predicted Project abundance and consequent mortality as assessed within the EIA Report for the operation and maintenance stage

Species	Season	Mean peak abundance (OAA plus 2km buffer)	Developer approach		Guidance approach	
			Displacement and mortality rate (%)	Consequent mortality (individuals per annum)	Displacement and mortality rate (%)	Consequent mortality (individuals per annum)
Kittiwake	Breeding	890	N/A	N/A	30% displacement; 1% to 3% mortality.	2.67 to 8.01.
	Non-breeding	144	N/A	N/A	30% displacement; 1% to 3% mortality	0.43 to 1.30.
Guillemot	Breeding	16,989	50% displacement; 0% to 1% mortality.	0.00 to 84.95.	60% displacement; 3% to 5% mortality.	305.80 to 509.67.
	Non-breeding	5,237	50% displacement; 0% to 1% mortality.	0.00 to 26.19.	60% displacement; 1% to 3% mortality.	31.42 to 94.27.
Razorbill	Breeding	356	50% displacement; 0% to 1% mortality.	0.00 to 1.78.	60% displacement; 3% to 5% mortality.	6.41 to 10.68.

Species	Season	Mean peak abundance (OAA plus 2km buffer)	Developer approach		Guidance approach	
			Displacement and mortality rate (%)	Consequent mortality (individuals per annum)	Displacement and mortality rate (%)	Consequent mortality (individuals per annum)
	Non-breeding	1,214	50% displacement; 0% to 1% mortality.	0.00 to 6.07.	60% displacement; 1% to 3% mortality.	7.28 to 21.85.
Puffin	Breeding	554	50% displacement; 0% to 1% mortality.	0.00 to 2.77.	60% displacement; 3% to 5% mortality.	9.97 to 16.62.
	Non-breeding	50	50% displacement; 0% to 1% mortality.	0.00 to 0.25.	60% displacement; 1% to 3% mortality.	0.30 to 0.90.
Gannet	Breeding	642	60% to 80% displacement; 0% to 1% mortality.	3.85 to 5.14*.	70% displacement; 1% to 3% mortality.	4.49 to 13.48.
	Non-breeding	304	60% to 80% displacement; 0% to 1% mortality.	1.82 to 2.43*.	70% displacement; 1% to 3% mortality.	2.13 to 6.38.

Table Note: * For the purposes of presenting the range of potential displacement effects the worst-case scenario of a 1% mortality rate only is presented. Please note, however, as concluded within **Section 6.2.3.5**, there is potential that the consequential mortality rate could be less than 1%.

6.2.5 Collision risk

Overview

6.2.5.1 There is potential risk to birds from offshore wind farms through collision with WTGs and infrastructure resulting in injury or fatality. This may occur when birds fly through the OAA whilst foraging for food, commuting between breeding sites and foraging areas, or during migration.

6.2.5.2 CRM has been carried out for the Project, with detailed methods and results presented in **Volume 3, Appendix 12.3** of the **EIA Report**, for seabird species identified as potentially at risk of collision based on their flight behaviour and recorded abundance within the Project.

6.2.5.3 CRM was undertaken using the Caneco version of the stochastic Collision Risk Modelling (sCRM) (Caneco and Humphries, 2022), using the recommended parameters within NatureScot Guidance Note 7 (NatureScot, 2025b) for each seabird species.

6.2.5.4 CRM accounts for several different species-specific behavioural aspects, including the height at which birds fly, their avoidance response to WTGs and how active they are diurnally and nocturnally. Details of these considerations are provided in **EIA Report Volume 3, Appendix 12.3** of the **EIA Report**.

6.2.5.5 In order to provide a range of values to capture variability for each species, the Applicant has run both a ‘most likely’ and ‘worst-case’ scenario for all species as recommended within NatureScot Guidance Note 7 (NatureScot, 2025b), the results of which can be found in **Volume 3, Appendix 12.3** of the **EIA Report**. For the purposes of assessment, the worst-case scenario has been assessed to ensure precaution in assessment conclusions.

Uncertainty around modelling input parameters to inform predicted impacts

6.2.5.6 As modelling undertaken to inform collision risk is based on theoretical calculation, it is important to understand the evidence bases used to inform recommended input parameters and the subsequent appropriateness of such values to inform assessment.

6.2.5.7 With respect to species flight speed, it is highly likely that the speed at which a bird flies is highly dependent on both wind speed and the type of flight behaviour exhibited. For instance, a seabird’s flight speed when commuting or during migratory flights is likely to differ from when it is actively foraging. Within the original Band model and subsequent sCRM updated model (Caneco and Humphries, 2022), an increase in flight speed leads to a greater flux of birds predicted to pass through the offshore wind farm, thus increasing collision risk. Within the guidance document for the original Band (2012) model, one area of uncertainty identified related to species biometrics, including flight speed due to the parameters being a single fixed value, which would represent birds undertaking a single behavioural flight type. The author stated within the guidance (Band, 2012) uncertainty relating to species biometrics and flight speed could affect the predicted impact by up to ±20%.

6.2.5.8 The flight speeds advocated within the NatureScot Guidance Note 7 (NatureScot, 2025b) are currently derived from Pennycuick (1997) for gannet and Alerstam *et al.* (2007) for great skua, great black-backed gull and kittiwake, though it is recognised that more recent studies are available. A review of the appropriateness of flight speeds within Pennycuick (1997) and Alerstam *et al.* (2007) to inform modelling was provided within the Crown Estate Round 4 Plan Level HRA collision modelling annex (Niras, 2022):

6.2.5.9 *“The flight speed for gannet calculated in Pennycuick (1997) is based on a small sample size with these data having been collected from birds flying at a breeding colony (Foula,* *Shetland). It is therefore possible that the flight speeds recorded are not representative of the flight speeds of birds foraging offshore. This is therefore likely to over-estimate collision risk estimates and increase the uncertainty associated with these estimates.*

6.2.5.10 *The birds observed by Alerstam et al. (2007) were located either in southern Sweden or within the Arctic circle and no differentiation is provided between migratory or foraging birds from colonies. Indeed, the large range of species included in Alerstam et al. (2007) suggests that non-breeding and/or migratory flights comprised a significant component of the data set. This is therefore likely to over-estimate collision risk estimates and increase the uncertainty associated with these estimates."*

6.2.5.11 Flight speeds of seabirds within an operational offshore wind farm have been collected at Thanet Offshore Wind Farm as part of the ORJIP avoidance study (Skov *et al.* 2018). This study used laser rangefinder tracking data to estimate flight speed both inside and outside the Thanet Offshore Wind Farm from 284 tracks over a period of approximately two years. Overall, flight speeds for both kittiwake and gannet were calculated to be considerably slower than currently recommended. This difference could be due to several factors such as differing temporal and spatial scales of data collection, limited data collected within Pennycuick (1997) and Alerstam *et al.* (2007), behavioural response to the offshore wind farm development or methodological differences.

6.2.5.12 Improvement in flight speed parameters for inclusion within assessment was recently assessed by Cook *et al.* (2023) on behalf of the Scottish Government. Cook *et al.* (2023) concluded:

6.2.5.13 "*Typical flight speeds may be lower than those reported in these previous studies, which are often collected in areas which may not be representative of conditions experienced offshore (Alerstam et al. 2007; Pennycuick, 1997). Accounting for these differences can result in a substantial reduction in the predicted collision rate*."

6.2.5.14 These studies suggest that currently advocated flight speeds are likely to be inflating the predicted impact of collision.

6.2.5.15 The recommended SNCB (2024) Nocturnal Activity Factors (NAFs) for seabirds are derived from Cook *et al.* (2023) for gannet, kittiwake and lesser black-backed gull. For herring gull and great black-backed gull, NAFs are derived from Garthe and Hüppop (2004). Prior to the recent CRM guidance updates (SNCBs, 2024), all NAFs were derived from Garthe and Hüppop (2004), which used a scoring index of expected NAF based on literature review and personal observations. Cook *et al.* (2023), provided updated parameters based on GPS tags deployed at colonies around the UK, the results of which recommended reduced NAFs comparative to the Garthe and Hüppop (2004) scoring indices. However, the author did note significant variability in NAF between colonies and years of deployment due to significant variation in daytime activity, suggesting that wider environmental conditions should be considered to ensure appropriate transferability within assessment (Cook *et al.* 2023). Additionally, the results of Cook *et al.* (2023) relates to the breeding season only, such rates therefore may not appropriately represent nocturnal activity during the non-breeding season. For herring gull and great black-backed gull, the results from Cook *et al.* (2023) suggest that the use of Garthe and Hüppop (2004) may not be appropriate for at least the breeding season.

6.2.5.16 The Bird Collision Avoidance Study funded by ORJIP, considered the potential avoidance rate of seabirds in response to Thanet Offshore Wind Farm (Skov *et al.* 2018). Over the two-year study period (between 2014 and 2016) over 12,000 bird movements were recorded throughout the day and night (Skov *et al.* 2018). It was reported that only six birds (all gull species) in total collided with wind turbines suggesting there is still significant levels of precaution within the latest avoidance rates recommended for modelling. Although the avoidance rates determined from the Thanet Offshore Wind Farm study (Skov *et al.* 2018) were considered within the determination of SNCBs latest recommended rates (SNCBs, 2024), the recommended species-specific rates from the study are far higher than those currently recommended in SNCB guidance (SNCBs, 2024).

6.2.5.17 The most recent empirical study of collision risk to seabirds (AOWFL, 2023) was undertaken over two years off the coast of Aberdeen at an offshore wind farm site with 11 wind turbines. This study collected data during the breeding and post-breeding season (covering the months of April to October 2020 and 2021). The study, which was based on over 10,000 bird videos over a two-year period, was able to estimate avoidance rates (in the micro and meso space), which were determined to be very high, suggesting that current collision model parameters are likely to overestimate risk.

6.2.5.18 Within the latest guidance (SNCBs, 2024), the avoidance rates outlined in the Ozsanlav-Harris *et al.* (2023) paper, are used. It must be noted that the current recommended values are mainly based on observations from onshore and coastal wind farms, which have significantly different design to offshore developments (such as far smaller air gap resulting in greater overlap of key seabird flight heights) and birds flight behaviour may differ between the onshore and offshore environment, resulting in difference in susceptibility to collision. The study (Ozsanlav-Harris *et al.* 2023) concluded that for gannet and kittiwake a generic ‘all gull’ rate is recommended, and for lesser black-backed gull, herring gull and great black-backed gull, a generic ‘large gull rate’ is recommended for use as the avoidance rate. These recommendations are despite the provision of species-specific avoidance rate within the study. Not using species specific avoidance rates, but rather, generic rates, adds precaution to the assessment as it does not account for inter-specific variation in the avoidance behaviour between species.

6.2.5.19 Therefore, it is considered that the CRM input parameters used in the assessment of collision risk to seabirds for the Project and those from other developments, especially cumulatively, incorporate a high degree of precaution for all species assessed. Examples of the level of sensitivity of CRM to changes in even a single variable have been provided for other recent offshore wind farm developments (GoBe, 2025; APEM, 2024; APEM, 2022), resulting in significant reductions in predicted impact.

Predicted collision risk consequent mortality

6.2.5.20 A summary of seasonal predicted collision consequent mortality prior to apportionment to individual designated site qualifying features is presented in **Table 6.7** Apportioning rates and consequent collision mortality is provided for each respective designated site qualifying feature screened in for assessment.

6.2.5.21 Confidence limits around the mean collision values have also been apportioned out to individual designated site qualifying features screened in for collision impact assessment are provided within **Appendix C**.

Table 6.7 Predicted collision risk consequent mortality as assessed within the EIA Report for the operation and maintenance stage

Species	Predicted collision risk (individuals)			
	Breeding season	Return migration season	Post-breeding migration season	Total non-breeding season
Great skua	0.68	N/A	N/A	0.00
Great black-backed gull	2.84	N/A	N/A	16.66
Kittiwake	22.54	10.36	5.70	16.06
Gannet	39.77	0.82	2.36	3.18

6.2.6 Population viability analysis

6.2.6.1 In accordance with NatureScot's Guidance Note 11 (NatureScot, 2023g), where an impact prediction results in a 0.02% change in population survival rate, further consideration of such a predicted impact has been completed via PVA. Details of the methodology followed for PVA modelled and subsequent outputs is provided in detail within **Appendix D**.

6.2.6.2 As requested by consultees (see consultation and engagement within **Volume 1, Chapter 12: Offshore and Intertidal Ornithology** of the **EIA Report**), the metrics used to infer population consequences predicted for PVA modelling are the median of the ratio of impacted to unimpacted Counterfactual of Population Growth Rate (CPGR) and the median Counterfactual of Population Size (CPS).

6.2.6.3 Although both the counterfactual of CPGR and CPS are presented within this report, the Project strongly disagrees with the comments received by the RSPB relating to PVA interpretation:

"The CPS is especially important to aid understanding of impacts for a non-specialist whereas the numbers given by the CPGR are less understandable beyond a population modelling context."

"The CPS is considered when the wind farm becomes operational and is preferred as it is more certain and more easily interpreted, Berwick Bank is a good example of this being used. A lot are identical even though numbers have been rounded up. Population size will be different."

6.2.6.4 The Project considers that only the CPGR should be used for interpreting the population effects on qualifying features. This is because the CPGR can be compared against known recent and historic population growth rates of differing populations to provide an informed and robust decision on the likely effect the Project may have on the colony long term. This also allows for easy inference for non-specialists of potential effects when population growth trend information is provided, as is the case within this report.

6.2.6.5 The CPS and CPGR are also not equally appropriate for model interpretation when modelling in the absence of density dependence, as is the case for the Project. A density independent population has no constraint on increased growth or any form of recovery in decline. This means that a density independent population with a positive growth rate will grow exponentially, and a negative growth population will eventually decline into extinction, for which the reality of both instances occurring in a natural population are recognised as being wholly unrealistic. This is due to a natural population not being physically able to exhibit exponential growth due to constraints on natural resources such as prey availability and nesting space. Similarly, a natural population in decline will eventually stabilise and possibly recover due to reduced competition for prey and nesting space. Therefore, in a simulation which excludes these natural constraints on population growth and decline the difference between the baseline and impacted populations will diverge by an increasing amount as the simulation duration increases, meaning that the CPS is time sensitive and becomes less accurate with increasing simulation time. Furthermore, due to the absence of density dependence, neither the baseline nor impacted population projections are likely to be credible since seabird populations are constrained by environmental and demographic variables, resulting in unrealistic population predictions for both the baseline (unimpacted) and impacted scenario modelled.

6.2.6.6 The CPS is therefore a highly subjective output, with non-specialists often inappropriately drawing conclusions based solely on a predicted large difference between the impacted and unimpacted scenario, which is not a robust conclusion. As noted above, further consideration of whether both scenarios remain in growth (and therefore population maintained in the long term) and the models ability to accurately predict population changes over a long term period (35 years and 50 years for the Project) in the absence of density dependant factors (such as availability of prey and increased / reduced competition and carrying capacity limits) should be taken into account for the CPS to inform a robust conclusion. Such additional factors are likely to be difficult for a non-specialist to confidently examine.

6.2.6.7 For the above reasons the Project’s approach to interpreting PVA conclusions is focussed on the CPGR.

6.2.7 Buchan Ness to Collieston Coast SPA

Site description

6.2.7.1 As identified during screening, Buchan Ness to Collieston Coast SPA boundary overlaps with the offshore export cable corridor and is located approximately 111km from the OAA.

6.2.7.2 SPA site description is as follows (NatureScot, 2024): *“Buchan Ness to Collieston Coast SPA is a stretch of south-east facing cliff in Aberdeenshire, Scotland. The 15 km stretch of cliffs, formed of granite, quartzite and other rocks, runs south of Peterhead, broken only by the sandy beach of Cruden Bay. The varied coastal vegetation on the ledges and the cliff tops includes maritime heath, grassland and brackish flushes. The boundary of the SPA follows the boundaries of Bullers of Buchan Coast SSSI and Collieston to Whinnyfold Coast SSSI, and the seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface.”*

Conservation objectives and condition assessment

6.2.7.3 The overarching conservation objectives for the SPA are listed below. Those relevant to assessment are highlighted bold, based on consideration of how the identified impact pathways may affect the qualifying features screened in for assessment:

- **To ensure that the qualifying features of the Buchan Ness to Collieston Coast SPA are in favourable condition and make an appropriate contribution to achieving FCS.**
- **To ensure that the integrity of the Buchan Ness to Collieston Coast SPA is restored in the context of environmental changes by meeting the following objectives for each feature:**
  - the population of the qualifying features are viable components of the Buchan Ness to Collieston Coast SPA;
  - **the distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and**
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at Buchan Ness to Collieston Coast SPA.

6.2.7.4 The condition status of qualifying features screened in for assessment (**Table 3.1**) are as follows:

- The latest condition assessment for the herring gull feature of Buchan Ness to Collieston Coast SPA was completed by NatureScot in 2024. The herring gull feature was classified as unfavourable condition, therefore, suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the kittiwake feature of Buchan Ness to Collieston Coast SPA was completed by NatureScot in 2024. The kittiwake feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the guillemot feature of Buchan Ness to Collieston Coast SPA was completed by NatureScot in 2024. The guillemot feature was classified to be in a favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.
- The latest condition assessment for the fulmar feature of Buchan Ness to Collieston Coast SPA was completed by NatureScot in 2024. The fulmar feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the shag feature of Buchan Ness to Collieston Coast SPA was completed by NatureScot in 2024. The shag feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.

Qualifying features requiring assessment

6.2.7.5 The qualifying features of Buchan Ness to Collieston Coast SPA where the potential for a LSE was concluded for identified effect pathways, seasons and Project stages are as follows:

- Herring gull:
  - direct temporary habitat loss within the offshore export cable corridor during construction and decommissioning (breeding season).
- Kittiwake:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season);
  - collision risk within the OAA during the O&M stage (breeding and non-breeding season); and
  - direct temporary habitat loss within the offshore export cable corridor during construction and decommissioning (breeding season).
- Guillemot:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season);
  - entanglement within the OAA during the O&M stage (breeding and non-breeding season); and
  - direct temporary habitat loss within the offshore export cable corridor during construction and decommissioning (breeding and non-breeding season).
- Fulmar:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - direct temporary habitat loss within the offshore export cable corridor during construction and decommissioning (breeding season).
- Shag:
  - direct temporary habitat loss / disturbance within the offshore export cable corridor during construction and decommissioning (breeding season).

6.2.7.6 For the above features **Table 6.8** provides information on the contemporaneous and latest count for relevant qualifying features which have been utilised for assessment of potential effects, where relevant.

Table 6.8 Buchan Ness to Collieston Coast SPA contemporaneous and latest count for relevant qualifying features

Qualifying feature	Contemporaneous count (Burnell *et al.* 2023; breeding adults)	Latest count (SMP, 2025; breeding adults)*
Kittiwake	22,590	31,406 (2025)
Guillemot	39,440	33,225 (2025)

Table Note: *Year of latest count provided in brackets.

6.2.7.7 Seasonal apportioning rates for each qualifying feature screened in for assessment are provided in **Table 6.9**. Further detail of how these apportioning rates have been derived is provided in **Appendix C**.

Table 6.9 Buchan Ness to Collieston Coast SPA apportionment results to inform assessment

Qualifying feature	Breeding season apportioning rate				Non-breeding season apportionment rate (%)		
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	Return migration rate (%; collision risk only)	Post-breeding migration rate (%; collision risk only)	Non-breeding rate (%; distributional responses only)
Kittiwake	18.96%	10%	69.14%	11.80%	2.40%	1.81%	2.40%
Guillemot	39.22%	7%	60.65%	22.12%	N/A	N/A	22.12%

Assessment of potential effects from the project alone

Herring gull

Direct temporary habitat loss during construction and decommissioning stages (offshore export cable corridor)

6.2.7.8 Herring gull are considered to have low vulnerability to noise, lighting and visual disturbances that may be present during construction activity. Being opportunistic feeders, they are often attracted to people and urban areas, scavenging food in close proximity to pedestrians and vehicles in noisy and well-lit areas (Burnell *et al.* 2023). They are also known to be attracted to vessels due to the potential of scavenging food from fishing vessels and so are not considered vulnerable to vessel presence. The presence of vessels within the export cable corridor section within close proximity to the SPA boundary is therefore not expected to impact the distribution of herring gulls within the site boundary, especially given the commitment to HDD for cable installation, to avoid and minimise direct habitat loss / disturbance within close proximity to the SPA.

6.2.7.9 For the remainder of the offshore export cable corridor, construction and decommissioning activities within the offshore export cable corridor are expected to be highly localised and temporary in nature, focussed on vessels in operation, with herring gull having the opportunity to return to the area when activities have ceased. Therefore, any short-term localised loss of habitat is not considered to result in a significant impact to the species. This is especially true considering that herring gull have a highly flexible and opportunistic foraging strategy, capable of utilising offshore, intertidal and terrestrial habitats.

6.2.7.10 Considering the species' low vulnerability and the Project's commitment to use HDD for cable installation (see **Appendix B**; M-056), the potential for adverse effects to the herring gull qualifying features of Buchan Ness to Collieston Coast SPA is highly limited for the construction stage. The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage. **Therefore, the potential for an AEoSI in relation to direct temporary habitat loss / disturbance effects during the construction and decommissioning stages can be confidently ruled out for the Project alone.**

Kittiwake

Population trend

6.2.7.11 The population growth trends of the Buchan Ness to Collieston Coast SPA kittiwake feature are based on census data within the SMP database (2025) (**Plate 6.1**, **Table 6.10**, **Table 6.11**). Since citation in 1988, the colony has undergone significant decline throughout the 2000s, up until 2023 where the colony has increased by 4.65% per annum since the previous count in 2019. In Scotland the kittiwake population increased by 21% post-HPAI in contrast to pre-HPAI, despite a minimum of 760 positive cases of the virus recorded for kittiwake (Tremlett *et al.* 2024). Individual kittiwake colony growth rate changes varied considerably from -83% to +191%, suggesting infection may have been more localised in comparison to the infection spread reported for other species (Tremlett *et al.* 2024). The increase in population size between 2019 and 2023 would suggest kittiwakes at Buchan Ness to Collieston Coast SPA were not significantly affected by HPAI, though further site-specific information on HPAI to support this conclusion is limited. The latest colony count suggests that kittiwake population is continuing to increase in size.

Plate 6.1 Population trend of the kittiwake feature of Buchan Ness to Collieston Coast SPA from 1986 to 2025 (SMP, 2025)

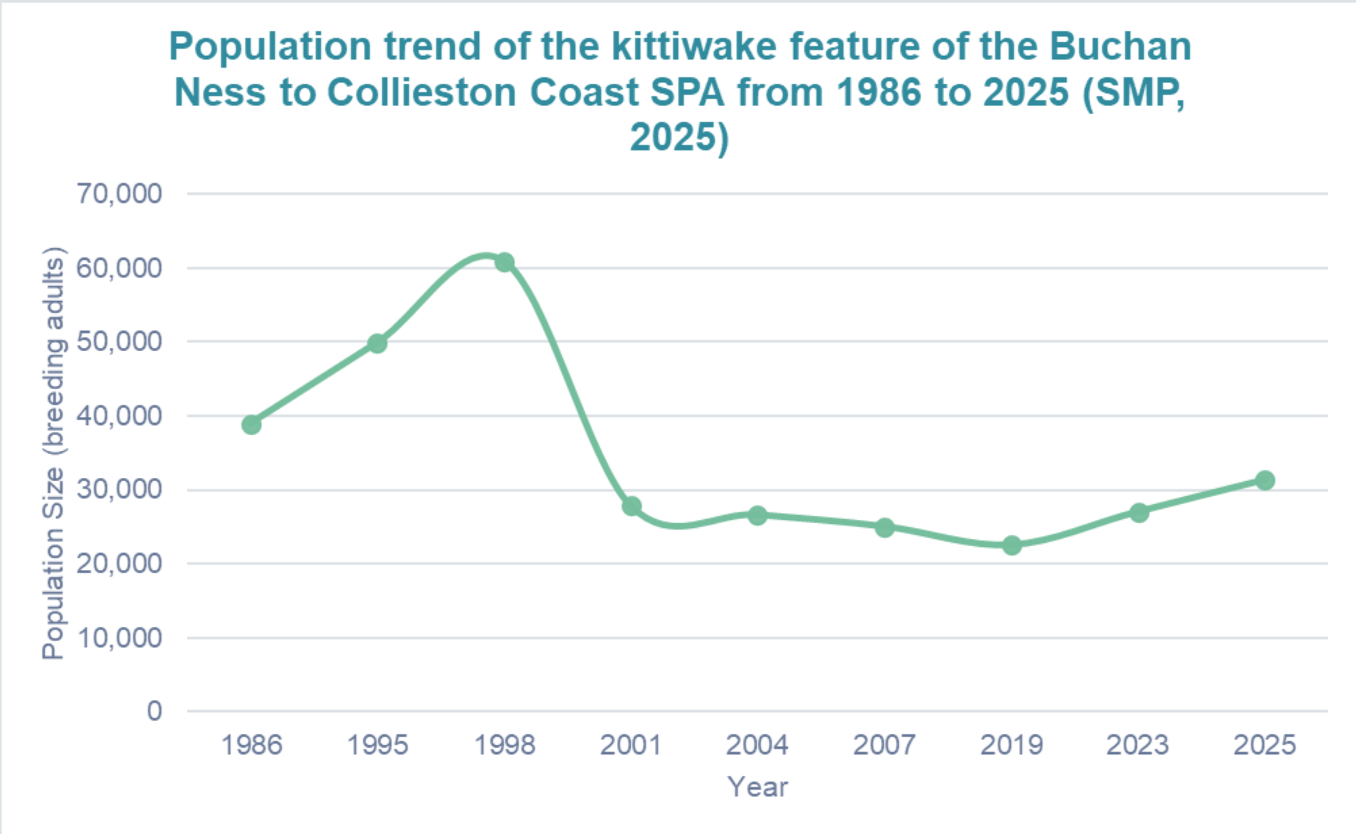

Table 6.10 Census data for the kittiwake feature of Buchan Ness to Collieston Coast SPA between 1985 to 2025

Year	Census Count								
	1986	1995	1998	2001	2004	2007	2019	2023	2025
Population (breeding adults)	38,996	49,914	60,904	27,844	26,660	25,084	22,590	27,094	31,406

Table 6.11 Annual compound growth rate for the kittiwake feature of Buchan Ness to Collieston Coast SPA between 1985 to 2025

Year	1986 to 2025	1986 to 1998	1998 to 2001	2001 to 2019	2019 to 2025	2023 to 2025
Change in population size (breeding adults)	-7,590	21,908	-33,060	-5,254	8,816	4,312
Annual compound growth rate (%)	-0.55%	3.79%	-22.96%	-1.16%	5.65%	7.66%

Distributional response during the operation and maintenance stage

6.2.7.12 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.12** These impact predictions are based on abundance and consequent mortality following the guidance preferred displacement and mortality rates presented in **Table 6.6,** apportioned to the kittiwake feature of Buchan Ness to Collieston Coast SPA using the apportioning rates presented in **Table 6.9** The appropriateness of the proposed displacement and mortality rates for the guidance approach is summarised within **Section 6.2.4**

6.2.7.13 A displacement matrix is also presented within **Table 6.13** for the predicted annual breeding adult apportioned abundance for the kittiwake feature of the Buchan Ness to Collieston Coast SPA within the Project OAA plus 2km buffer.

Table 6.12 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the kittiwake feature of Buchan Ness to Collieston Coast SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			30% Disp; 1 - 3% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	22,590	Breeding season	0.32 to 0.95	0.001% to 0.004%
		Non-breeding season	0.01 to 0.03	<0.001%
		Annual	0.33 to 0.98	0.001% to 0.004%
Latest count (2025)	31,406	Breeding season	0.32 to 0.95	0.001% to 0.003%
		Non-breeding season	0.01 to 0.03	<0.001%
		Annual	0.33 to 0.98	0.001% to 0.003%

6.2.7.14 As summarised in **Table 6.12**, the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.13 Buchan Ness to Collieston Coast SPA kittiwake feature operation and maintenance stage displacement matrix

Displacement (%)	Mortality (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
10	0	0	0	0	0	1	1	2	3	4	5	7	8	9	10	11
20	0	0	0	1	1	1	2	4	7	9	11	13	15	17	20	22
30	0	0	1	1	1	2	3	7	10	13	16	20	23	26	29	33
40	0	0	1	1	2	2	4	9	13	17	22	26	30	35	39	43
50	0	1	1	2	2	3	5	11	16	22	27	33	38	43	49	54
60	0	1	1	2	3	3	7	13	20	26	33	39	46	52	59	65
70	0	1	2	2	3	4	8	15	23	30	38	46	53	61	68	76
80	0	1	2	3	3	4	9	17	26	35	43	52	61	69	78	87
90	0	1	2	3	4	5	10	20	29	39	49	59	68	78	88	98
100	0	1	2	3	4	5	11	22	33	43	54	65	76	87	98	108

Collision risk during the operation and maintenance stage

6.2.7.15 The level of predicted impact in relation to collision risk during the O&M stage is provided in **Table 6.14**. These impact predictions are based on the modelled collision mortality presented within **Table 6.7**, apportioned to the kittiwake feature of Buchan Ness to Collieston Coast SPA using the apportioning rates presented in **Table 6.9**. There is no deviation between the preferred approach proposed by the Applicant and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised in **Section 6.2.5** and how this may affect the impact predictions presented.

Table 6.14 Summary of predicted collision risk during the operation and maintenance stage apportioned to the kittiwake feature of Buchan Ness to Collieston Coast SPA following the guidance approach

Population count	Population size	Season	Predicted impact	
			Predicted collisions (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	22,590	Breeding season	2.66	0.012%
		Return migration season	0.25	-
		Post-breeding migration season	0.10	-
		Total non-breeding season	0.35	0.002%
		Annual	3.01	0.013%
Latest count (2025)	31,406	Breeding season	2.66	0.008%
		Return migration season	0.25	-
		Post-breeding migration season	0.10	-

Population count	Population size	Season	Predicted impact	
			Predicted collisions (breeding adults per annum)	Percentage point change in survival rate (%)
		Total non-breeding season	0.35	0.001%
		Annual	3.01	0.010%

6.2.7.16 As summarised in **Table 6.14**, regardless of the approach taken the level of impacted predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to collision risk during the O&M stage can confidently be ruled out for the Project alone.**

Combined effects during the operation and maintenance stage

6.2.7.17 Due to the kittiwake feature of Buchan Ness to Collieston Coast SPA being screened in for assessment of both distributional response and collision risk, there is potential for both effect pathways to impact the feature combined. Consideration of both impacts combined is presented within **Table 6.15** for the guidance approach to assessment of distributional responses.

6.2.7.18 As is standard practice predicted displacement and collision consequent mortality have been added together to inform the level of predicted combined impact. It's important to note that simply adding both impacts together is highly likely to lead to an overestimate of impact, as a bird that is displaced cannot consequently collide with a WTG and vice versa.

Table 6.15 Summary of predicted combined distributional response and collision risk impact during the operation and maintenance stage apportioned to the kittiwake feature of Buchan Ness to Collieston Coast SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted Impact	
			CRM + 30% Disp; 1 - 3% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	22,590	Breeding season	2.97 - 3.60	0.013 - 0.016%
		Non-breeding season	0.36 - 0.38	0.002 - 0.002%
		Annual	3.34 - 3.99	0.015 - 0.018%
Latest count (2025)	31,406	Breeding season	2.97 - 3.60	0.009 - 0.011%
		Non-breeding season	0.36 - 0.38	0.001 - 0.001%
		Annual	3.34 - 3.99	0.011 - 0.013%

6.2.7.19 As summarised in **Table 6.15**, the level of impacted predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to combined collision risk and distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Direct temporary habitat loss / disturbance during construction and decommissioning stages (offshore export cable corridor)

6.2.7.20 Kittiwake are considered to have low vulnerability to noise, lighting and visual disturbances that may be present during construction activity (Fliessbach *et al.* 2019). The presence of vessels within the export cable corridor section within close proximity to the SPA boundary is therefore not expected to impact the distribution of kittiwake within the site boundary, especially given the commitment to HDD for cable installation, to avoid and minimise direct habitat loss / disturbance within close proximity to the SPA.

6.2.7.21 Construction and decommissioning activities within the offshore export cable corridor are expected to be highly localised and temporary in nature, focussed on vessels in operation, with kittiwake having the opportunity to return to the area when activities have ceased.

Therefore, any short-term localised loss of habitat is not considered to result in a significant impact to the species. This is especially true considering kittiwake are predominately surface feeders capable of travelling large distances (known mean maximum foraging range (MMFR) plus one SD of 300.6km (Woodward *et al.* 2019)).

6.2.7.22 Considering the species' low vulnerability and the Project's commitment to use HDD for cable installation, the potential for adverse effects to the kittiwake qualifying features of Buchan Ness to Collieston Coast SPA are highly limited for the construction stage. The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage and so the same conclusion applies for the decommissioning stage. **Therefore, the potential for an AEoSI in relation to direct temporary habitat loss / disturbance effects during the construction and decommissioning stages can be confidently ruled out for the Project alone.**

Guillemot

Population trend

6.2.7.23 The population growth trends of the Buchan Ness to Collieston Coast SPA guillemot feature are based on census data within the SMP database (2025) **(Plate 6.2**, **Table 6.16**, **Table 6.17**). Since citation in 1988, the colony has fluctuated in size, with significant decline recorded in the early 2000s, followed by recovery and growth up until 2023. The latest count in 2025, recorded a reduction in population size compared to 2023, though the cause of decline is unknown. The effect of HPAI on guillemot colonies in Scotland varied considerably, though northeast Scotland mainland colonies (such as Buchan Ness to Collieston Coast SPA) primarily recorded positive growth when comparing pre and post HPAI surveys (Tremlett *et al.* 2024). However, it is unclear whether this suggests HPAI had a limited impact on such colonies, or the change is related to other factors (such as population redistribution or survey error) (Tremlett *et al.* 2024).

Plate 6.2 Population trend of the guillemot feature of Buchan Ness to Collieston Coast SPA from 1986 to 2025 (SMP, 2025)

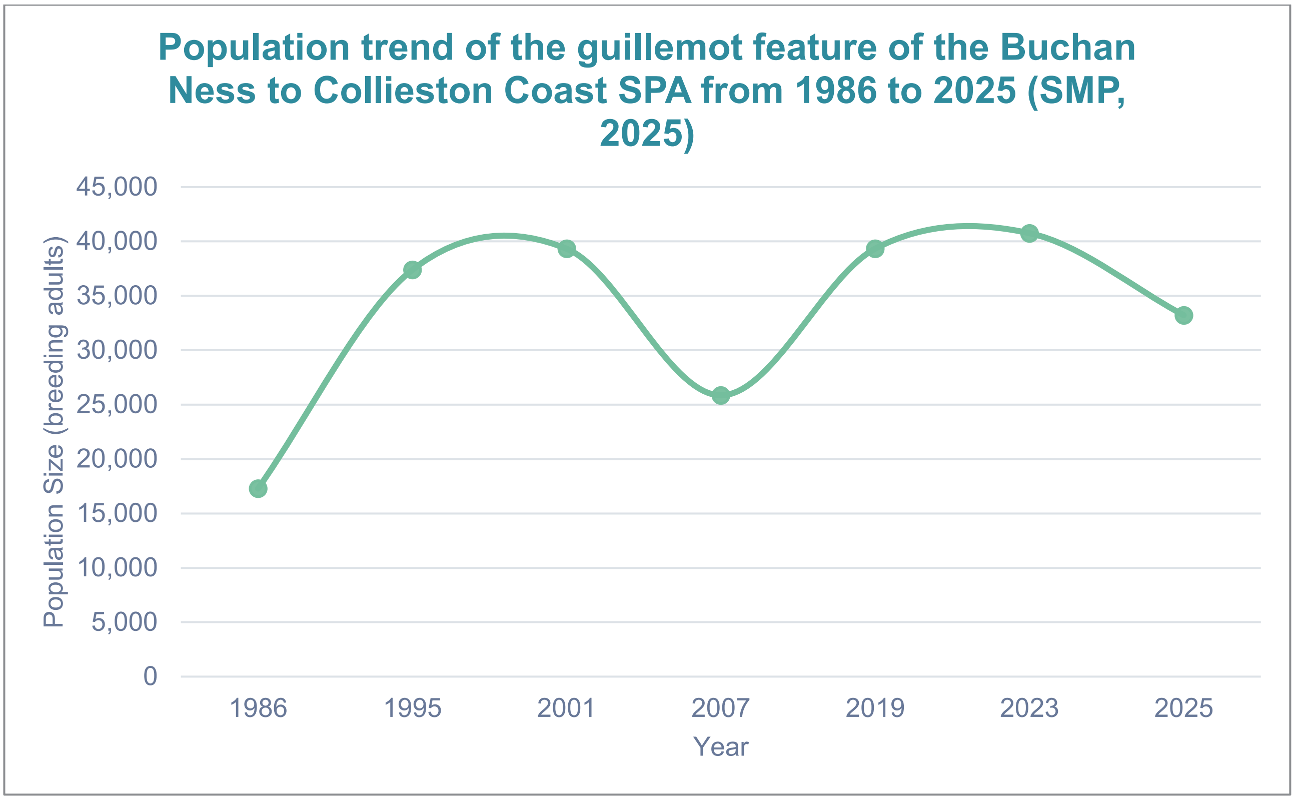

Table 6.16 Census data for the guillemot feature of Buchan Ness to Collieston Coast SPA between 1986 to 2025

Year	Census Count						
	1986	1995	2001	2007	2019	2023	2025
Population (breeding adults)	17,281	37,385	39,332	25,857	39,440	40,763	33,225

Table 6.17 Annual compound growth rate for the guillemot feature of Buchan Ness to Collieston Coast SPA between 1986 to 2025

Year	1986 to 2025	1986 to 1995	1995 to 2001	2001 to 2007	2007 to 2019	2019 to 2023	2023 to 2025
Change in population size (breeding adults)	15,945	20,104	1,947	-13,475	13,584	1,323	-7,538
Annual compound growth rate (%)	1.69%	8.95%	0.85%	-6.75%	3.58%	0.83%	-9.72%

Distributional response during the operation and maintenance stage

6.2.7.24 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.18** and **Table 6.19**. These impact predictions are based on abundance and consequent mortality following both the Developer and guidance preferred displacement and mortality rates presented in **Table 6.6**, apportioned to the guillemot feature of Buchan Ness to Collieston Coast SPA using the apportioning rates presented in Table 6.9. The appropriateness of the proposed displacement and mortality rates for the Developer and guidance approaches are summarised within **Section 6.2.4**.

6.2.7.25 A displacement matrix is also presented within **Table 6.20** for the predicted annual breeding adult apportioned abundance for the guillemot feature of Buchan Ness to Collieston Coast SPA within the Project OAA plus 2km buffer.

Table 6.18 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the guillemot feature of Buchan Ness to Collieston Coast SPA following the Developer approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			50% Disp; 0 to 1% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	39,440	Breeding season	0.00 to 19.94	0.000% to 0.051%
		Non-breeding season	0.00 to 5.98	0.000% to 0.015%
		Annual	0.00 to 25.92	0.000% to 0.066%
Latest count (2025)	33,225	Breeding season	0.00 to 19.94	0.000% to 0.060%
		Non-breeding season	0.00 to 5.98	0.000% to 0.018%
		Annual	0.00 to 25.92	0.000% to 0.078%

Table 6.19 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the guillemot feature of Buchan Ness to Collieston Coast SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			60% Disp; 1 to 5% Mort (breeding adults per annum)*	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	39,440	Breeding season	71.78 to 119.64	0.182% to 0.303%
		Non-breeding season	7.17 to 21.51	0.018% to 0.055%
		Annual	78.96 to 141.15	0.200% to 0.358%
Latest count (2025)	33,225	Breeding season	71.78 to 119.64	0.216% to 0.360%
		Non-breeding season	7.17 to 21.51	0.022% to 0.065%
		Annual	78.96 to 141.15	0.238% to 0.425%

Table Note: *As summarised in **Table 6.6**, a mortality rate of 3 to 5% has been applied during the breeding season and a mortality rate of 1 to 3% has been applied during the non-breeding season

6.2.7.26 As summarised in **Table 6.18** and **Table 6.19**, the level of impacted predicted annually or seasonally exceeds a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) further consideration of the predicted impact is required via PVA.

6.2.7.27 PVA has been undertaken for the 35-year operational lifetime of the Project and modelled using the latest count of 33,225 breeding adults. Outputs are presented in **Table 6.20** below, including the predicted median reduction in annual growth rate (CGR) and median reduction in final population size (CPS). PVA modelling was undertaken using density independent modelling, and therefore the CGR value is considered a more reliable metric than CPS values for interpreting impacts (see **Section 6.2.6**). For full details on PVA methodology, see **Appendix C**.

6.2.7.28 The known recent and historic growth trends of the guillemot feature of Buchan Ness to Collieston Coast SPA are presented within **Table 6.17.** When interpreting the PVA outputs presented within **Table 6.20**, it is important to consider the following points:

- Since citation in 1988, the colony has fluctuated in size, with significant decline recorded **in the early 2000s, followed by recovery and growth up until 2023** (**Plate 6.2, Table 6.16, Table 6.17**). The reason for such a decline in the population is likely due to a reduction in key prey abundance and adverse weather event leading to a significant auk wreck within the early 2000's (Burnell *et al.,* 2023).

- The latest count in 2025 recorded a reduction in population size compared to 2023 **Table 6.17**), though the cause of decline is unknown.
- The sandeel (Prohibition of Fishing) (Scotland) Order 2024 should reduce the risk of another significant reduction in key prey abundance for guillemot.
- The effect of HPAI on guillemot colonies in Scotland varied considerably, though northeast Scotland mainland colonies (such as Buchan Ness to Collieston Coast SPA) primarily recorded positive growth when comparing pre and post HPAI surveys (Tremlett *et al.,* 2024). However, it is unclear whether this suggests HPAI had a limited impact on such colonies, or the change is related to other factors (such as population redistribution or survey error) (Tremlett *et al.,* 2024).
- The guillemot feature of Buchan Ness to Collieston Coast SPA is currently classified as being in favourable condition.
- The potential effect predicted for the guidance approach is highly likely to be an overestimate. There is strong evidence to support the use of the Developer approach to auk displacement rate of 50% and a 1% mortality rate at most, whereas evidence for the use of a mortality rate of up to 5% per annum is limited (**Section 6.2.4**).

6.2.7.29 When considering the favourable condition status and the minor decrease in population trend for the Developer approach, the colony is likely resilient enough to withstand such a reduction in growth whilst maintaining the population size. This is supported by the rate of annual compound growth from 2007-2019 of 3.56% and from 1986-1995 of 8.95%, following records of previous historic declines.

6.2.7.30 However, it is acknowledged that the upper guidance approach equates to a 0.48% reduction in annual growth rate. Although when compared to recent growth trends the population would remain in positive growth, there is uncertainty around the impact of such a sustained reduction in growth over a long-term period.

6.2.7.31 Therefore, **the potential for an AEoSI in relation to distributional response impacts during the O&M stage cannot be ruled out for the Project alone**.

Table 6.20 PVA results for annual predicted impacts from the Project alone apportioned to the guillemot feature of Buchan Ness to Collieston Coast SPA

Scenario modelled	Annual increase in mortality (breeding adults)	Density independent counterfactual metric (35yrs)			
		Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35yrs (%)
50% Displacement, 1% mortality	25.9	0.999	0.09	0.969	3.12
60% displacement, 3% mortality (breeding, 1% mortality (non-breeding)	79.0	0.997	0.27	0.908	9.19
60% displacement, 5% mortality (breeding, 3% mortality (non-breeding)	141.2	0.995	0.48	0.842	15.85

Table 6.21 Buchan Ness to Collieston Coast SPA guillemot feature operation and maintenance stage displacement matrix

Displacement (%)	Mortality (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	1	2	2	3	5	10	16	21	26	31	36	41	47	52
10	0	5	10	16	21	26	52	104	155	207	259	311	363	415	466	518
20	0	10	21	31	41	52	104	207	311	415	518	622	726	829	933	1,037
30	0	16	31	47	62	78	155	311	466	622	777	933	1,088	1,244	1,399	1,555
40	0	21	41	62	83	104	207	415	622	829	1,037	1,244	1,451	1,659	1,866	2,073
50	0	26	52	78	104	130	259	518	777	1,037	1,296	1,555	1,814	2,073	2,332	2,592
60	0	31	62	93	124	155	311	622	933	1,244	1,555	1,866	2,177	2,488	2,799	3,110
70	0	36	73	109	145	181	363	726	1,088	1,451	1,814	2,177	2,540	2,903	3,265	3,628

Displacement (%)	Mortality (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
80	0	41	83	124	166	207	415	829	1,244	1,659	2,073	2,488	2,903	3,317	3,732	4,147
90	0	47	93	140	187	233	466	933	1,399	1,866	2,332	2,799	3,265	3,732	4,198	4,665
100	0	52	104	155	207	259	518	1,037	1,555	2,073	2,592	3,110	3,628	4,147	4,665	5,183

Direct temporary habitat loss during construction and decommissioning stages (offshore export cable corridor)

6.2.7.32 Guillemot is considered moderately sensitive to vessel disturbance due to their limited habitat flexibility and specialist foraging behaviours (Furness *et al.* 2013). However, their sensitivity is largely context dependant (e.g., vessel size, speed, noise). Fliessbach *et al.* (2019) calculated a traffic Disturbance Vulnerability Index (DVI) for Northwest European seabirds, calculating the risk of disturbance for a range of seabird species in the German North and Baltic Seas. For guillemot, responses were variable, with 17% of guillemot recorded flying away from a vessel, and 20% escape diving (n=929). Mean escape distances for these species were 127m (+/- 113m). Although guillemot are considered to have a moderate vulnerability to the presence of vessels, significant distributional shifts within the site boundary are not expected due to the commitment to HDD for cable installation, to avoid and minimise direct habitat loss / disturbance within close proximity to the SPA.

6.2.7.33 For the remainder of the offshore export cable corridor, construction and decommissioning activities within the offshore export cable corridor are expected to be highly localised and temporary in nature, focussed on vessels in operation, with guillemot having the opportunity to return to the area when activities have ceased. Therefore, any short-term localised loss of habitat is not considered to result in a significant impact to the species.

6.2.7.34 Considering the species' moderate vulnerability and the Project commitments to use HDD for cable installation (see **Appendix B**; M-056), to avoid and minimise direct habitat loss / disturbance, the potential for adverse effects to the guillemot qualifying features of Buchan Ness to Collieston Coast SPA are highly limited for the construction stage. The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage and so the same conclusion applies for the decommissioning stage. **Therefore, the potential for an AEoSI in relation to direct temporary habitat loss / disturbance effects during the construction and decommissioning stages can be confidently ruled out for the Project alone.**

Entanglement during the operation and maintenance stage

6.2.7.35 As summarised in **Section 6.2.16**, **the potential for an AEoSI in relation to entanglement during the O&M stage for the guillemot feature of Buchan Ness to Collieston Coast SPA can confidently be ruled out.**

Fulmar

Distributional response during the operation and maintenance stage

6.2.7.36 The assessment of distributional response effects for the fulmar feature of Buchan Ness to Collieston Coast SPA is presented within **Section 6.2.17**. As concluded within **Section 6.2.17**, **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Direct temporary habitat loss during construction and decommissioning stages (offshore export cable corridor)

6.2.7.37 Fulmar are considered to have low vulnerability to noise, lighting and visual disturbances that may be present during construction activity (Fliessbach *et al.* 2019). Being opportunistic feeders, they are often attracted to vessels due to the potential of scavenging food from fishing vessels and so are not considered vulnerable to vessel presence (Garthe and Huppop, 1994). The presence of vessels within the export cable corridor section within close proximity to the SPA boundary is therefore, not expected to impact the distribution of fulmar within the site boundary, especially given the commitment to HDD for cable installation, to avoid and minimise direct habitat loss / disturbance within close proximity to the SPA.

6.2.7.38 For the remainder of the offshore export cable corridor, construction and decommissioning activities are expected to be highly localised and temporary in nature, focussed on vessels in operation, with fulmar having the opportunity to return to the area when activities have ceased. Therefore, any short-term localised loss of habitat is not considered to result in a significant impact to the species. This is especially true considering fulmars are predominately surface feeders and have a highly extensive known foraging range, capable of travelling large distances in search of prey (Mean Maximum Foraging Range (MMFR) plus one Standard Deviation (SD) of 1,200km (Woodward *et al.* 2019)).

6.2.7.39 Considering the species' low vulnerability and the Project's commitment to use HDD for cable installation (see **Appendix B**; M-056), the potential for adverse effects to the fulmar qualifying features of Buchan Ness to Collieston Coast SPA are highly limited for the construction and decommissioning stage. The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage and so the same conclusion applies for the decommissioning stage. **Therefore, the potential for an AEoSI in relation to direct temporary habitat loss / disturbance effects during the construction and decommissioning stages can be confidently ruled out for the Project alone.**

Shag

Direct temporary habitat loss during construction and decommissioning stages (offshore export cable corridor)

6.2.7.40 Although evidence on shag vulnerability to anthropogenic disturbance is limited, Garthe and Hüppop (2004) classify the species as highly sensitive to ship and helicopter traffic, and Velando and Munilla (2011) observed avoidance behaviour in response to vessel presence. However, shags are frequently seen using man-made structures such as piers and harbour walls for loafing and wing-drying, often in areas with regular human activity. This suggests that local habituation may occur, potentially reducing their sensitivity to disturbance in some contexts. Disturbance vulnerability is therefore considered to be moderate. Although shag are considered to have a moderate vulnerability to the presence of vessels, significant distributional shifts within the site boundary are not expected due to the commitment to HDD for cable installation, to avoid and minimise direct habitat loss / disturbance within close proximity to the SPA.

6.2.7.41 For the remainder of the offshore export cable corridor, construction and decommissioning activities are not expected to affect shag significantly, as they primarily forage within inshore waters (MMFR plus one SD of 13.2km (Woodward *et al.* 2019)). Therefore, low numbers of shag are expected to be utilising the offshore environment, limiting the potential for an effect to occur. Further, construction and decommissioning activities within the offshore export cable corridor are expected to be highly localised and temporary in nature, focussed on vessels in operation, with shag having the opportunity to return to the area when activities have ceased. Therefore, any short-term localised loss of habitat is not considered to result in a significant impact to the species.

6.2.7.42 Despite the species' moderate vulnerability due to the Project's commitment to use HDD for cable installation (see **Appendix B**; M-056), the potential for adverse effects to the shag qualifying features of Buchan Ness to Collieston Coast SPA are limited for the construction and decommissioning stage. The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage and so the same conclusion applies for the decommissioning stage. **Therefore, the**

potential for an AEoSI in relation to direct temporary habitat loss / disturbance effects during the construction and decommissioning stages can be confidently ruled out for the Project alone.

6.2.8 Troup, Pennan and Lion's Heads SPA

Site description

6.2.8.1 As identified at screening stage the Troup, Pennan and Lion's Heads SPA is located approximately 111km from the OAA. Given the distance from the SPA, the Project does not directly overlap with the SPA boundary or any known functionally linked areas.

6.2.8.2 SPA site description is as follows (NatureScot, 2024): *"The Troup, Pennan and Lion's Heads SPA is a 9km stretch of sea cliffs along the Aberdeenshire coast. The cliffs support large colonies of breeding seabirds. The boundary of the SPA overlaps with the boundary of Gamrie and Pennan coast SSSI and the seaward extension extends approximately 2km into the marine environment to include the seabed, water column and surface."*

Conservation objectives and condition assessment

6.2.8.3 The overarching conservation objectives for the SPA are listed below. Those relevant to assessment are highlighted bold, based on consideration of how the identified impact pathways may affect the qualifying features screened in for assessment:

- To ensure that the qualifying features of the Troup, Pennan and Lion's Heads SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the Troup, Pennan and Lion's Heads SPA is restored in the context of environmental changes by meeting the following objectives for each feature:**
  - **the population of the qualifying features are viable components of the Troup, Pennan and Lion's Heads SPA;**
  - the distribution of the qualifying features is maintained, or where appropriate restored, throughout the site by avoiding significant disturbance of the species; and
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at Troup, Pennan and Lion's Heads SPA.

6.2.8.4 The condition status of qualifying features screened in for assessment (**Table 3.1**) are as follows:

- The latest condition assessment for the kittiwake feature Troup, Pennan and Lion's Heads SPA was completed by NatureScot in 2024. The kittiwake feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the guillemot feature of Troup, Pennan and Lion's Heads SPA was completed by NatureScot in 2024. The guillemot feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the razorbill feature of Troup, Pennan and Lion's Heads SPA was completed by NatureScot in 2024. Razorbill was classified to be in a favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.

- The latest condition assessment for the fulmar feature Troup, Pennan and Lion's Heads SPA was completed by NatureScot in 2017. The fulmar feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.

Qualifying features requiring assessment

6.2.8.5 The qualifying features of Troup, Pennan and Lion's Heads SPA where the potential for a LSE was concluded for identified effect pathways, seasons and Project stages are as follows:

- Kittiwake:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - collision risk within the OAA during the O&M stage (breeding and non-breeding season).
- Guillemot:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - entanglement within the OAA during the O&M stage (breeding and non-breeding season).
- Razorbill:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - entanglement within the OAA during the O&M stage (breeding and non-breeding season).
- Fulmar:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season).

6.2.8.6 For the above features **Table 6.22** provides information on the contemporaneous and latest count for relevant qualifying features which have been utilised for assessment of potential effects, where relevant.

Table 6.22 Troup, Pennan and Lion's Heads SPA contemporaneous and latest count for relevant qualifying features

Qualifying feature	Contemporaneous count (Burnell *et al.* 2023; breeding adults)	Latest count (SMP,2025; breeding adults)*
Kittiwake	21,232	27,344 (2017-2023)
Guillemot	31,893	47,719 (2017-2023)
Razorbill	6,054	8,801 (2017-2023)

Table Note: *Year of latest count provided in brackets.

6.2.8.7 Seasonal apportioning rates for each qualifying feature screened in for assessment are provided in **Table 6.23**. Further detail of how these apportioning rates have been derived is provided in **Appendix C**.

Table 6.23 Troup, Pennan and Lion's Heads SPA apportionment results to inform assessment

Qualifying feature	Breeding season apportioning rate				Non-breeding season apportionment rate (%)		
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	Return migration rate (%; collision risk only)	Post-breeding migration rate (%; collision risk only)	Non-breeding rate (%; distributional responses only)
Kittiwake	18.28%	10%	69.14%	11.37%	2.85%	2.15%	2.85%
Guillemot	33.70%	7%	60.65%	19.01%	N/A	N/A	19.01%
Razorbill	38.21%	7%	58.58%	20.82%	N/A	N/A	0.48%

Assessment of potential effects from the project alone

Kittiwake

Population trend

6.2.8.8 The population growth trends of the Troup, Pennan and Lion's Heads SPA kittiwake feature are based on census data within the SMP database (2025) (**Plate 6.3, Table 6.24, Table 6.25**) for the Troup, Pennan and Lion's Heads RSPB count sector, which makes up the majority of the SPA population. Since citation in 1986, the colony population has fluctuated in size, though overall a long-term downward trend is observed. Within the last five years the colony has remained relatively stable, with minor increase in population size recorded pre and post HPAI. In Scotland the kittiwake population increased by 21% post-HPAI in contrast to pre-HPAI, despite a minimum of 760 positive cases of the virus recorded for kittiwake (Tremlett *et al.* 2024). Individual kittiwake colony growth rate changes varied considerably from -83% to +191%, suggesting infection may have been more localised in comparison to the infection spread reported for other species (Tremlett *et al.* 2024). The stable population size between 2021-2023 would suggest kittiwakes at Troup, Pennan and Lion's Heads SPA were not significantly affected by HPAI, though further site-specific information on HPAI is limited to support this conclusion.

Plate 6.3 Population trend for kittiwake within the Troup, Pennan and Lion's Heads RSPB count sector from 1986 to 2023 (SMP, 2025)

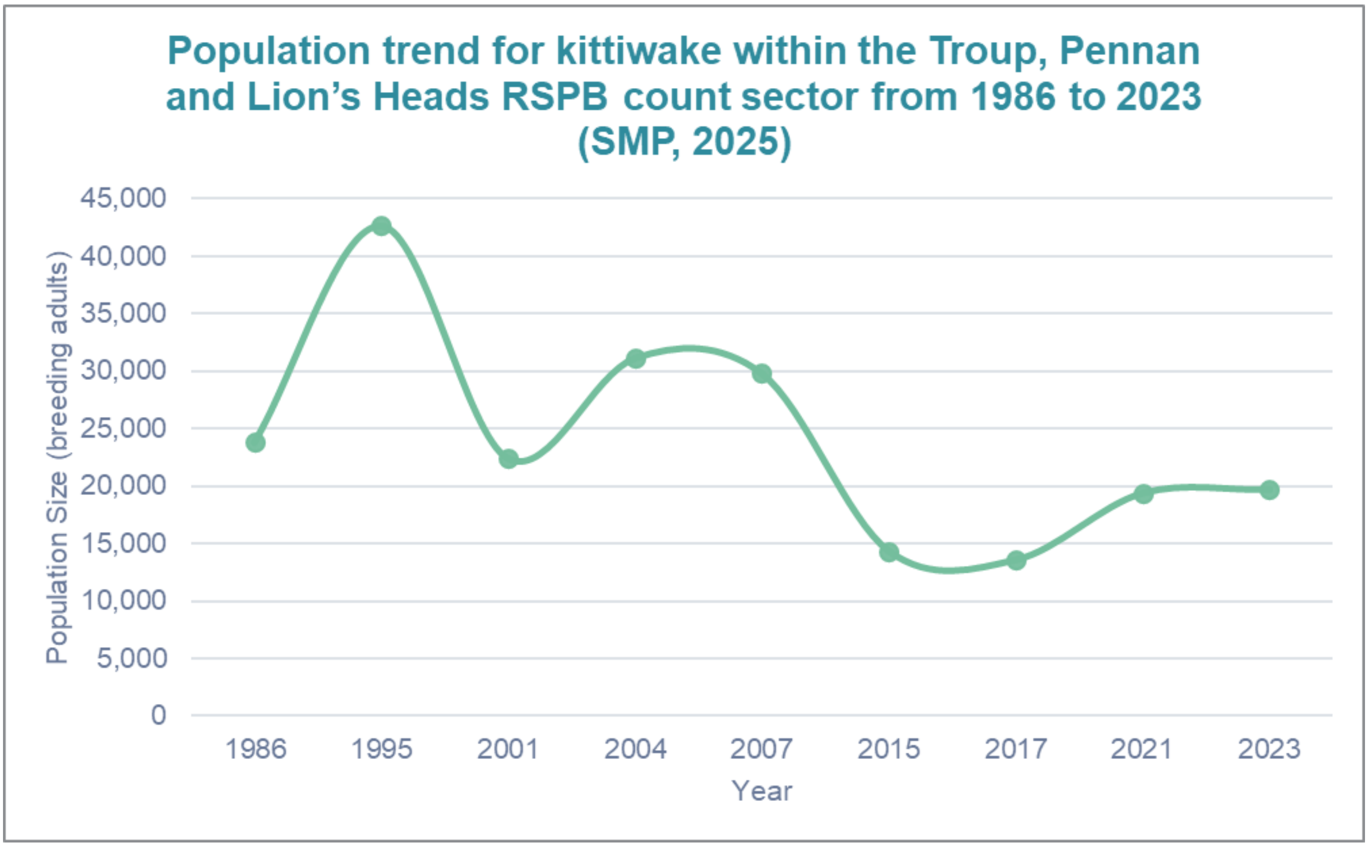

Table 6.24 Census data for kittiwake within the Troup, Pennan and Lion's Heads RSPB count sector from 1986 to 2023

Year	Census Count								
	1986	1995	2001	2004	2007	2015	2017	2021	2023
Population (breeding adults)	23,784	42,650	22,410	31,140	29,792	14,360	13,594	19,400	19,706

Table 6.25 Annual compound growth rate for kittiwake within the Troup, Pennan and Lion's Heads RSPB count sector from 1986 to 2023

Year	1986 to 2023	1986 to 1995	1995 to 2001	2001 to 2004	2004 to 2017	2017 to 2023	2021 to 2023
Change in population size (breeding adults)	-4,078	18,866	-20,240	8,730	-17,546	6,112	306
Annual compound growth rate (%)	-0.51%	6.70%	-10.17%	11.59%	-6.18%	6.38%	0.79%

Distributional response during the operation and maintenance stage

6.2.8.9 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.26**. These impact predictions are based on abundance and consequent mortality following the guidance preferred displacement and mortality rates presented in **Table 6.6**, apportioned to the kittiwake feature of Troup, Pennan and Lion's Heads SPA using the apportioning rates presented in **Table 6.23**. The appropriateness of the proposed displacement and mortality rates for the Developer and guidance approaches are summarised within **Section 6.2.4**.

6.2.8.10 A displacement matrix is also presented within **Table 6.27** for the predicted annual breeding adult apportioned abundance for the kittiwake feature of Troup, Pennan and Lion's Heads SPA within the Project OAA plus 2km buffer.

Table 6.26 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the kittiwake feature of Troup, Pennan and Lion's Heads SPA following the Developer approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			30% Disp; 1 to 3% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	21,232	Breeding season	0.30 to 0.91	0.001% to 0.004%
		Non-breeding season	0.01 to 0.04	0.000% to 0.000%
		Annual	0.32 to 0.95	0.001% to 0.004%
Latest count (2017 to 2023)	27,344	Breeding season	0.30 to 0.91	0.001% to 0.003%
		Non-breeding season	0.01 to 0.04	0.000% to 0.000%
		Annual	0.32 to 0.95	0.001% to 0.003%

6.2.8.11 As summarised in **Table 6.26**, regardless of the approach taken the level of impacted predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.27 Troup, Pennan and Lion's Heads SPA kittiwake feature operation and maintenance stage displacement matrix

Displacement (%)	Mortality (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
10	0	0	0	0	0	1	1	2	3	4	5	6	7	8	9	11
20	0	0	0	1	1	1	2	4	6	8	11	13	15	17	19	21
30	0	0	1	1	1	2	3	6	9	13	16	19	22	25	28	32
40	0	0	1	1	2	2	4	8	13	17	21	25	29	34	38	42
50	0	1	1	2	2	3	5	11	16	21	26	32	37	42	47	53
60	0	1	1	2	3	3	6	13	19	25	32	38	44	51	57	63
70	0	1	1	2	3	4	7	15	22	29	37	44	52	59	66	74

Displacement (%)	**Mortality (%)**															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
80	0	1	2	3	3	4	8	17	25	34	42	51	59	67	76	84
90	0	1	2	3	4	5	9	19	28	38	47	57	66	76	85	95
100	0	1	2	3	4	5	11	21	32	42	53	63	74	84	95	105

Collision risk during the operation and maintenance stage

6.2.8.12 The level of predicted impact in relation to collision risk during the O&M stage is provided in **Table 6.28** These impact predictions are based on the modelled collision mortality presented within **Table 6.7**, apportioned to the kittiwake feature of Troup, Pennan and Lion's Heads SPA using the apportioning rates presented in **Table 6.23.** There is no deviation between the preferred approach proposed by the Applicant and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised in **Section 6.2.5** and how this may affect the impact predictions presented.

Table 6.28 Summary of predicted collision risk during the operation and maintenance stage apportioned to the kittiwake feature of Troup, Pennan and Lion's Heads SPA following the guidance approach

Population count	Population size	Season	Predicted impact	
			Predicted collisions (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	21,232	Breeding season	2.56	0.012%
		Return migration season	0.30	-
		Post-breeding migration season	0.12	-
		Total non-breeding season	0.42	0.002%
		Annual	2.98	0.014%
Latest count (2017-2023)	27,344	Breeding season	2.56	0.009%
		Return migration season	0.30	-
		Post-breeding migration season	0.12	-
		Total non-breeding season	0.42	0.002%
		Annual	2.98	0.011%

6.2.8.13 As summarised in **Table 6.28**, the level of impacted predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to collision risk during the O&M stage can confidently be ruled out for the Project alone**.

Combined effects during the operation and maintenance stage

6.2.8.14 Due to the kittiwake feature of Troup, Pennan and Lion's Heads SPA being screened in for assessment of both distributional response and collision risk, there is potential for both effect pathways to impact the feature combined. Consideration of both impacts combined is presented within **Table 6.29** for the guidance approach to assessment of distributional responses.

6.2.8.15 As is standard practice predicted displacement and collision consequent mortality have been added together to inform the level of predicted combined impact. It's important to note that simply adding both impacts together is highly likely to lead to an overestimate of impact, as a bird that is displaced cannot consequently collide with a WTG and vice versa.

Table 6.29 Summary of predicted combined distributional response and collision risk impact during the operation and maintenance stage apportioned to the kittiwake feature of Troup, Pennan and Lion's Heads SPA following the Developer approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			CRM + 30% Disp; 1 to 3% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	21,232	Breeding season	2.87 to 3.47	0.014% to 0.016%
		Non-breeding season	0.43 to 0.45	0.002% to 0.002%
		Annual	3.30 to 3.93	0.016% to 0.019%
Latest count (2017-2023)	27,344	Breeding season	2.87 to 3.47	0.010% to 0.013%
		Non-breeding season	0.43 to 0.45	0.002% to 0.002%
		Annual	3.30 to 3.93	0.012% to 0.014%

6.2.8.16 As summarised in **Table 6.29**, the level of impacted predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to combined collision risk and distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Guillemot

Population trend

6.2.8.17 The population growth trends of the Troup, Pennan and Lion's Heads SPA guillemot feature are based on census data within the SMP database (2025) **(Plate 6.4, Table 6.30, Table 6.31**) for the Troup, Pennan and Lion's Heads RSPB count sector, which makes up the majority of the SPA population. From 1986-2001 the colony underwent considerable growth, following which a significant crash in the population was recorded in 2007. Between 2003-2007 Scottish guillemot colonies recorded a drop in productivity which is believed to correlate with a reduction in sandeel abundance at the time (Burnell *et al.* 2023), which likely explains the population decline observed at Troup, Pennan and Lion's Heads SPA. Within recent years the colony has undergone a steady increase in population size, despite potential effects of HPAI. The effect of HPAI on guillemot colonies in Scotland varied considerably, though northeast Scotland mainland colonies (such as Troup, Pennan and Lion's Heads SPA) primarily recorded positive growth when comparing pre and post HPAI surveys (Tremlett *et al.* 2024). However, it is unclear whether this suggests HPAI had a limited impact on such colonies, or the change is related to other factors (such as population redistribution or survey error) (Tremlett *et al.* 2024).

Plate 6.4 Population trend for guillemot within the Troup, Pennan and Lion's Heads RSPB count sector from 1986 to 2023 (SMP, 2025)

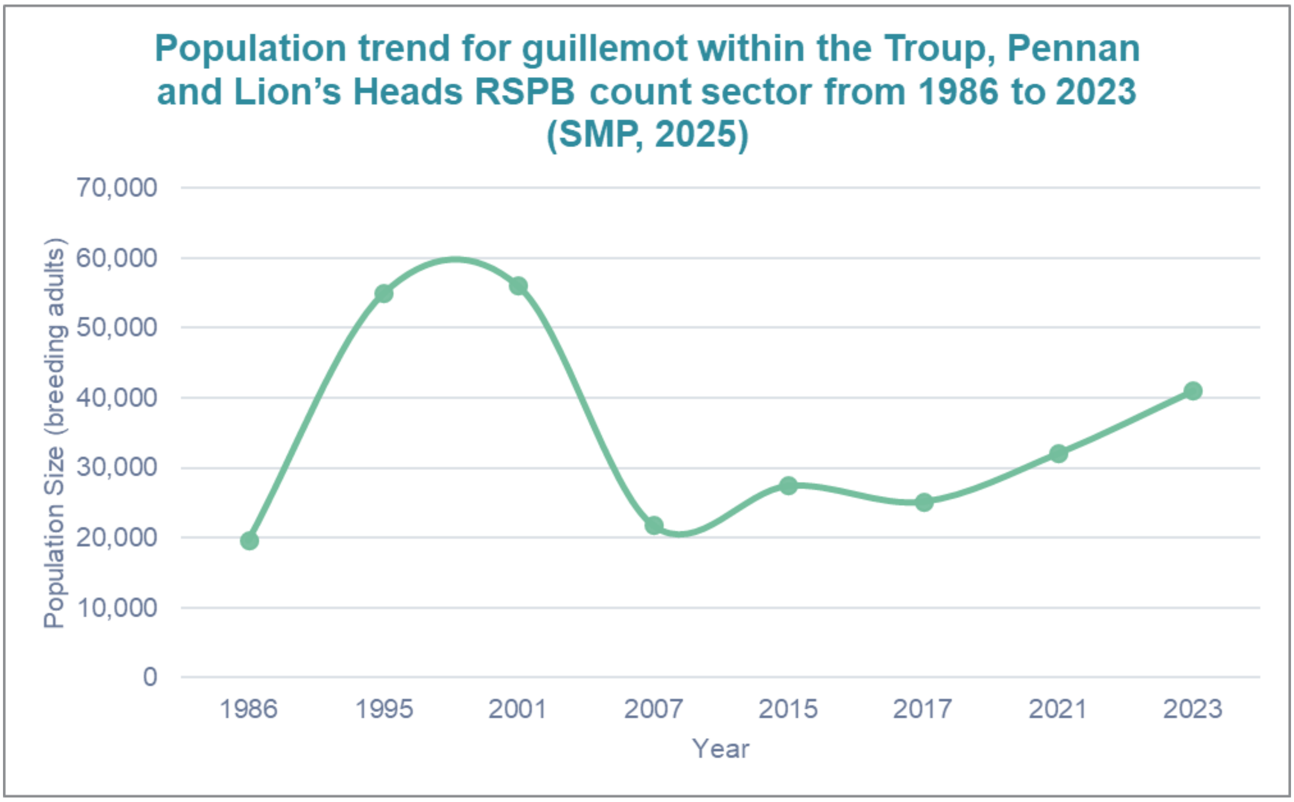

Table 6.30 Census data for guillemot within the Troup, Pennan and Lion's Heads RSPB count sector between 1986 to 2023

Year	Census Count							
	1986	1995	2001	2007	2015	2017	2021	2023
Population (breeding adults)	19,736	55,007	56,092	21,876	27,522	25,263	32,160	41,088

Table 6.31 Annual compound growth rate for guillemot within the Troup, Pennan and Lion's Heads RSPB count sector between 1986 to 2023

Year	1986 to 2023	1986 to 1995	1995 to 2001	2001 to 2007	2007 to 2017	2017 to 2023	2021 to 2023
Change in population size (breeding adults)	21,353	35,271	1,085	-34,217	3,388	15,825	8,928
Annual compound growth rate (%)	2.00%	12.06%	0.33%	-14.52%	1.45%	8.44%	13.03%

Distributional response during the operation and maintenance stage

6.2.8.18 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.32** and **Table 6.52**. These impact predictions are based on abundance and consequent mortality following both the Developer and guidance preferred displacement and mortality rates presented in **Table 6.6**, apportioned to the guillemot feature of Troup, Pennan and Lion's Heads SPA using the apportioning rates presented in Table 6.23. The appropriateness of the proposed displacement and mortality rates for the Developer and guidance approaches are summarised within **Section 6.2.4**.

6.2.8.19 A displacement matrix is also presented within **Table 6.33** for the predicted annual breeding adult apportioned abundance for the guillemot feature of Troup, Pennan and Lion's Heads SPA within the Project OAA plus 2km buffer.

Table 6.32 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the guillemot feature of Troup, Pennan and Lion's Heads SPA following the Developer approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			50% Disp; 0 - 1% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	31,893	Breeding season	0.00 to 17.14	0.000% to 0.054%
		Non-breeding season	0.00 to 5.14	0.000% to 0.016%
		Annual	0.00 to 22.27	0.000% to 0.070%
Latest count (2017-2023)	47,719	Breeding season	0.00 to 17.14	0.000% to 0.036%
		Non-breeding season	0.00 to 5.14	0.000% to 0.011%
		Annual	0.00 to 22.27	0.000% to 0.047%

Table 6.33 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the guillemot feature of Troup, Pennan and Lion's Heads SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			60% Disp; 1 - 5% Mort (breeding adults per annum)*	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	31,893	Breeding season	61.69 to 102.82	0.193% to 0.322%
		Non-breeding season	6.16 to 18.49	0.019% to 0.058%
		Annual	67.85 to 121.31	0.213% to 0.380%
Latest count (2017-2023)	47,719	Breeding season	61.69 to 102.82	0.129% to 0.215%
		Non-breeding season	6.16 to 18.49	0.013% to 0.039%
		Annual	67.85 to 121.31	0.142% to 0.254%

Table Note: *As summarised in **Table 6.6**, a mortality rate of 3 to 5% has been applied during the breeding season and a mortality rate of 1 to 3% has been applied during the non-breeding season

6.2.8.20 As summarised in **Table 6.32** and **Table 6.52** the level of impacted predicted annually or seasonally exceeds a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) further consideration of the predicted impact is required via PVA.

6.2.8.21 PVA has been undertaken for the 35-year operational lifetime of the Project and modelled using the latest count of 47,719 breeding adults. Outputs are presented in **Table 6.34** below, including the predicted median CGR and median CPS. PVA modelling was undertaken using density independent modelling, and therefore the CGR value is considered a more reliable metric than CPS values for interpreting impacts (see **Section 6.2.6**). For full details on PVA methodology, see **Appendix C**.

6.2.8.22 The known recent and historic growth trends of the guillemot feature of Troup, Pennan and Lion's Heads SPA are presented within **Table 6.31**. When interpreting the PVA outputs presented within **Table 6.34**, it is important to consider the following points:

- From 1986-2001 the colony underwent considerable growth, following which a significant crash in the population was recorded in 2007 based on census data for the Troup, Pennan and Lion's Heads RSPB count sector (**Plate 6.4, Table 6.30, Table 6.31**). The reason for such a decline in the population is likely due to a reduction in key prey abundance and adverse weather event leading to a significant auk wreck within the early 2000's (Burnell *et al.,* 2023).

- The sandeel (Prohibition of Fishing) (Scotland) Order 2024 should reduce the risk of another significant reduction in key prey abundance for guillemot.
- Within recent years the colony has undergone a steady increase in population size based on the census records for the Troup, Pennan and Lion's Heads RSPB count sector. An annual compound growth rate of 1.54% was recorded from 2007-2017 and 8.44% was recorded from 2017-2023 (**Table 6.31**).
- The effect of HPAI on guillemot colonies in Scotland varied considerably, though northeast Scotland mainland colonies (such as Troup, Pennan and Lion's Heads SPA) primarily recorded positive growth when comparing pre and post HPAI surveys (Tremlett *et al.,* 2024). However, it is unclear whether this suggests HPAI had a limited impact on such colonies, or the change is related to other factors (such as population redistribution or survey error) (Tremlett *et al.,* 2024).
- The kittiwake feature of Troup, Pennan and Lion's Heads SPA is currently classified as being in unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The potential effect predicted for the guidance approach is highly likely to be an overestimate. There is strong evidence to support the use of the Developer approach to auk displacement rate of 50% and a 1% mortality rate at most, whereas the use of a mortality rate of up to 5% per annum is not supported by current available evidence (**Section 6.2.4**).

6.2.8.23 The predicted impact is most realistically considered against the Developer approach, which results in a 0.05% reduction in annual population growth rate. This impact is sufficiently small that it would be indistinguishable from natural fluctuations in the population and can confidently be concluded as not resulting in an AEoSI and therefore is not considered to impact the recovery conservation objective.

6.2.8.24 Due to the colony recording significant growth over approximately the last 20 years (**Table 6.31**), the upper guidance approach which equates to a 0.29% reduction in annual growth rate is not expected to impede the recovery of the colony.

6.2.8.25 Therefore, **the potential for an AEoSI in relation to distributional response impacts during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.34 PVA results for annual predicted impacts from the Project alone apportioned to the guillemot feature of Troup, Pennan and Lion's Head SPA

Scenario modelled	Annual increase in mortality (breeding adults)	Density independent counterfactual metric (35yrs)			
		Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35yrs (%)
50% Displacement, 1% mortality	22.3	0.999	0.05	0.981	1.88
60% displacement, 3% mortality (breeding, 1% mortality (non-breeding)	67.9	0.998	0.16	0.944	5.60
60% displacement, 5% mortality (breeding, 3% mortality (non-breeding)	121.3	0.997	0.29	0.902	9.81

Table 6.35 Troup, Pennan and Lion's Heads SPA guillemot feature operation and maintenance stage displacement matrix

Displacement (%)	Mortality (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	1	1	2	2	4	9	13	18	22	27	31	36	40	45
10	0	4	9	13	18	22	45	89	134	178	223	267	312	356	401	445
20	0	9	18	27	36	45	89	178	267	356	445	535	624	713	802	891
30	0	13	27	40	53	67	134	267	401	535	668	802	935	1,069	1,203	1,336
40	0	18	36	53	71	89	178	356	535	713	891	1,069	1,247	1,425	1,604	1,782
50	0	22	45	67	89	111	223	445	668	891	1,114	1,336	1,559	1,782	2,004	2,227
60	0	27	53	80	107	134	267	535	802	1,069	1,336	1,604	1,871	2,138	2,405	2,673
70	0	31	62	94	125	156	312	624	935	1,247	1,559	1,871	2,183	2,494	2,806	3,118
80	0	36	71	107	143	178	356	713	1,069	1,425	1,782	2,138	2,494	2,851	3,207	3,564
90	0	40	80	120	160	200	401	802	1,203	1,604	2,004	2,405	2,806	3,207	3,608	4,009
100	0	45	89	134	178	223	445	891	1,336	1,782	2,227	2,673	3,118	3,564	4,009	4,454

Entanglement during the operation and maintenance stage

6.2.8.26 As summarised in **Section 6.1.2.16**, the potential for an AEoSI in relation to entanglement during the O&M stage for the guillemot feature of Troup, Pennan and Lion's Heads SPA can confidently be ruled out.

Razorbill

Population trend

6.2.8.27 The population growth trends of the Troup, Pennan and Lion's Heads SPA razorbill feature are based on census data within the SMP database (2025) (**Plate 6.5, Table 6.36, Table 6.37**) for the Troup, Pennan and Lion's Heads RSPB count sector, which makes up the majority of the SPA population. From 1986 to 1995 the colony underwent considerable growth, following which a continued decline in the population was recorded before stabilising in 2015. Similar to guillemot, razorbills are sensitive to changes in prey abundance which may explain the population decline observed at Troup, Pennan and Lion's Heads SPA in the early 2000's (Burnell *et al.* 2023). Additionally, a large wreck event was recorded in 2007 relating to adverse weather which may explain the further decline in the population beyond 2007 (Burnell *et al.* 2023). Within recent years the colony has undergone a steady increase in population size, despite potential effects of HPAI. No detailed consideration of the potential effect of HPAI on razorbills is provided within Tremlett *et al.* (2024) due to low mortality from HPAI recorded for razorbill.

Plate 6.5 Population trend for razorbill within the Troup, Pennan and Lion's Heads RSPB count sector from 1986 to 2023 (SMP, 2025)

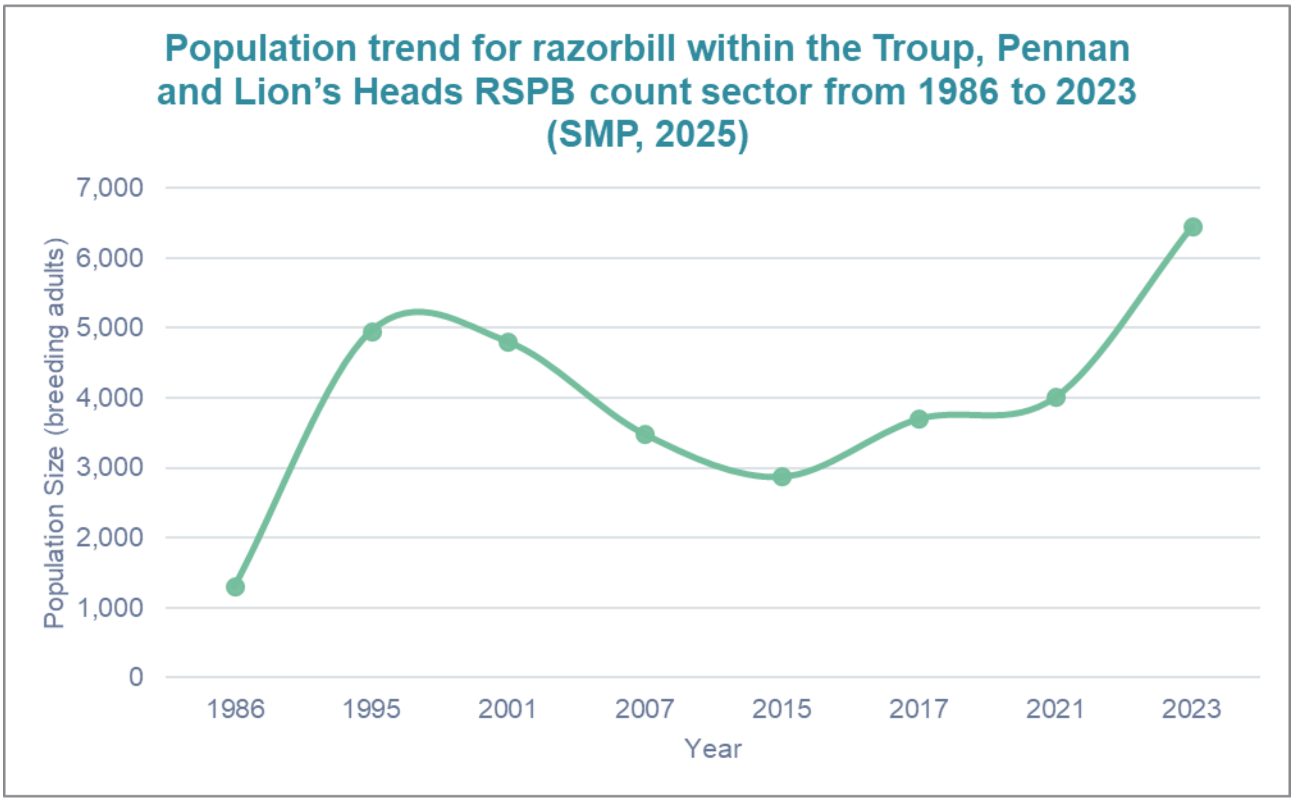

Table 6.36 Census data for razorbill within the Troup, Pennan and Lion's Heads RSPB count sector between 1986 to 2023

Year	Census Count							
	1986	1995	2001	2007	2015	2017	2021	2023
Population (breeding adults)	1,302	4,961	4,808	3,485	2,877	3,701	4,011	6,448

Table 6.37 Annual compound growth rate for razorbill within the Troup, Pennan and Lion's Heads RSPB count sector between 1986 to 2023

Year	1986 to 2023	1986 to 1995	1995 to 2001	2001 to 2007	2007 to 2017	2017 to 2023	2021 to 2023
Change in population size (breeding adults)	5,146	3,658	-153	-1,323	216	2,747	2,437
Annual compound growth rate (%)	4.42%	16.02%	-0.52%	-5.22%	0.60%	9.69%	26.80%

Distributional response during the operation and maintenance stage

6.2.8.28 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.38** and **Table 6.39.** These impact predictions are based on abundance and consequent mortality following both the Developer and guidance preferred displacement and mortality rates presented in **Table 6.6,** apportioned to the razorbill feature of Troup, Pennan and Lion's Heads SPA using the apportioning rates presented in **Table 6.23**. The appropriateness of the proposed displacement and mortality rates for the Developer and guidance approaches are summarised within **Section 6.2.4**.

6.2.8.29 A displacement matrix is also presented within **Table 6.40** for the predicted annual breeding adult apportioned abundance for the razorbill feature of Troup, Pennan and Lion's Heads SPA within the Project OAA plus 2km buffer.

Table 6.38 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the razorbill feature of Troup, Pennan and Lion's Heads SPA following the Developer approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			50% Disp; 0 - 1% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	6,054	Breeding season	0.00 to 0.37	0.000% to 0.006%
		Non-breeding season	0.00 to 0.03	0.000% to 0.000%
		Annual	0.00 to 0.40	0.000% to 0.007%
Latest count (2017-2023)	8,801	Breeding season	0.00 to 0.37	0.000% to 0.004%
		Non-breeding season	0.00 to 0.03	0.000% to 0.000%
		Annual	0.00 to 0.40	0.000% to 0.005%

Table 6.39 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the razorbill feature of Troup, Pennan and Lion's Heads SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			60% Disp; 1 - 5% Mort (breeding adults per annum)*	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	6,054	Breeding season	1.33 to 2.22	0.022% to 0.037%
		Non-breeding season	0.03 to 0.10	0.001% to 0.002%
		Annual	1.37 to 2.33	0.023% to 0.038%
Latest count (2017-2023)	8,801	Breeding season	1.33 to 2.22	0.015% to 0.025%
		Non-breeding season	0.03 to 0.10	0.000% to 0.001%
		Annual	1.37 to 2.33	0.016% to 0.026%

Table Note: *As summarised in **Table 6.6**, a mortality rate of 3 to 5% has been applied during the breeding season and a mortality rate of 1 to 3% has been applied during the non-breeding season

6.2.8.30 In relation to the Developer approach presented in **Table 6.38**, the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g), no further consideration of the predicted impact is required. However, when considering the guidance approach summarised in **Table 6.39** the level of impact predicted annually or seasonally exceeds a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) further consideration of the predicted impact is required via PVA.

6.2.8.31 PVA has been undertaken for the 35-year operational lifetime of each of the Project's phases and modelled using the latest count of 8,801 breeding adults. Outputs are presented in **Table 6.40** below, including the predicted median CGR and median CPS. PVA modelling was undertaken using density independent modelling, and therefore the CGR value is considered a more reliable metric than CPS values for interpreting impacts (see **Section 6.2.6**). For full details on PVA methodology, see **Appendix C**.

6.2.8.32 The known recent and historic growth trends of the razorbill feature of Troup, Pennan and Lion's Heads SPA are presented within **Table 6.31**. When interpreting the PVA outputs presented within **Table 6.40**, it is important to consider the following points:

- From 1986-1995 the colony underwent considerable growth, following which a continued decline in the population was recorded before stabilising in 2015 based on the Troup, Pennan and Lion's Heads RSPB count sector (**Plate 6.5, Table 6.37**). The reason for such a decline in the population is likely due to a reduction in key prey abundance and adverse weather event leading to a significant auk wreck within the early 2000's (Burnell *et al.,* 2023).
- The sandeel (Prohibition of Fishing) (Scotland) Order 2024 should reduce the risk of another significant reduction in key prey abundance for razorbill.
- Since 2015 the colony has undergone considerable growth with compound annual growth rate predictions of 6.69% from 2017-2023 and 26.80% from 2021-2023 based on the Troup, Pennan and Lion's Heads RSPB count sector (**Table 6.37**).
- The razorbill feature of Troup, Pennan and Lion's Heads SPA is currently classified as being in favourable condition.
- No detailed consideration of the potential effect of HPAI on razorbills is provided within Tremlett *et al*. (2024) due to low mortality from HPAI recorded for razorbill.
- The potential effect predicted for the guidance approach is highly likely to be an overestimate. There is strong evidence to support the use of the Developer approach to auk displacement rate of 50% and a 1% mortality rate at most, whereas the use of a mortality rate of up to 5% per annum is not supported by current available evidence (**Section 6.2.4**).

6.2.8.33 Regardless of approach, the predicted reduction in growth rates presented within **Table 6.40** are sufficiently small that they would be indistinguishable from natural fluctuations. Therefore, **the potential for an AEoSI in relation to distributional response impacts during the O&M stage can confidently be ruled out for the Project alone. Subject to natural change, razorbill will be maintained as a feature in the long term**.

Table 6.40 PVA results for annual predicted impacts from the Project alone apportioned to the razorbill feature of Troup, Pennan and Lion's Head SPA

Scenario modelled	Annual increase in mortality (breeding adults)	Density independent counterfactual metric (35yrs)			
		Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35yrs (%)
60% displacement, 3% mortality (breeding, 1% mortality (non-breeding)	1.4	1.000	0.02	0.993	0.67
60% displacement, 5% mortality (breeding, 3% mortality (non-breeding)	2.3	1.000	0.04	0.988	1.16

Table 6.41 Troup, Pennan and Lion's Heads SPA razorbill feature operation and maintenance stage displacement matrix

Displacement (%)	**Mortality (%)**															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
10	0	0	0	0	0	0	1	2	2	3	4	5	6	6	7	8
20	0	0	0	0	1	1	2	3	5	6	8	10	11	13	14	16
30	0	0	0	1	1	1	2	5	7	10	12	14	17	19	22	24
40	0	0	1	1	1	2	3	6	10	13	16	19	22	26	29	32
50	0	0	1	1	2	2	4	8	12	16	20	24	28	32	36	40
60	0	0	1	1	2	2	5	10	14	19	24	29	34	38	43	48
70	0	1	1	2	2	3	6	11	17	22	28	34	39	45	50	56

Displacement (%)	**Mortality (%)**															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
80	0	1	1	2	3	3	6	13	19	26	32	38	45	51	58	64
90	0	1	1	2	3	4	7	14	22	29	36	43	50	58	65	72
100	0	1	2	2	3	4	8	16	24	32	40	48	56	64	72	80

Entanglement during the operation and maintenance stage

6.2.8.34 As summarised in **Section 6.2.16**, **the potential for an AEoSI in relation to entanglement during the O&M stage for the razorbill feature of Troup, Pennan and Lion's Heads SPA can confidently be ruled out.**

Fulmar

Distributional response during the operation and maintenance stage

6.2.8.35 The assessment of distributional response effects for the fulmar feature of Troup, Pennan and Lion's Heads SPA is presented within **Section 6.2.17**. As concluded within **Section 6.2.17**, **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

6.2.9 Forth Islands SPA

Site description

6.2.9.1 As identified at screening stage the Forth Islands SPA is located approximately 249km from the OAA. Given the distance from the SPA, the Project does not directly overlap with the SPA boundary or any known functionally linked areas.

6.2.9.2 The Forth Islands SPA site description is as follows (NatureScot, 2018): "*The Forth Islands SPA consists of a series of islands supporting the main seabird colonies in the Firth of Forth. The islands of Inchmickery, Isle of May, Fidra, the Lamb, Craigleith and Bass Rock were classified on 25 April 1990. The extension to the site, classified on the 16 February 2004 consists of the island of Long Craig, which, at the time of classification, supported the largest colony of roseate tern in Scotland. It is the most northerly of only six regular British colonies. The seaward extension extends approximately 2km into the marine environment to include the seabed, water column and surface."*

Conservation objectives and condition assessment

6.2.9.3 The overarching conservation objectives for the SPA are listed below. Those relevant to assessment are highlighted bold, based on consideration of how the identified impact pathways may affect the qualifying features screened in for assessment:

- To ensure that the qualifying features of the Forth Islands SPA are in favourable condition and make an appropriate contribution to achieving FCS; and
- **To ensure that the integrity of the Forth Islands SPA is restored in the context of environmental changes by meeting the following objectives for each qualifying feature:**
  - **the populations of the qualifying features are viable components of the Forth Islands SPA;**
  - the distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at the Forth Islands SPA.

6.2.9.4 The condition status of qualifying features screened in for assessment (**Table 3.1**) are as follows:

- The latest condition assessment for the kittiwake feature of Forth Islands SPA was completed by NatureScot in 2024. The kittiwake feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the razorbill feature of Forth Islands SPA was completed by NatureScot in 2024. The razorbill feature was classified to be in a favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.
- The latest condition assessment for the puffin feature of Forth Islands SPA was completed by NatureScot in 2024. The puffin feature was classified to be in a favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.
- The latest condition assessment for the gannet feature of Forth Islands SPA was completed by NatureScot in 2018. The gannet feature was considered to be in a favourable condition, therefore suggesting that the conservation objectives in relation to population size has been maintained. However, this condition conclusion does not take into account the recent effect of HPAI on the feature as discussed below.

Qualifying features requiring assessment

6.2.9.5 The qualifying features of Forth Islands SPA where the potential for a LSE was concluded for identified effect pathways, seasons and Project stages are as follows:

- Kittiwake:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - collision risk within the OAA during the O&M stage (breeding and non-breeding season).
- Razorbill:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - entanglement within the OAA during the O&M stage (breeding and non-breeding season).
- Puffin:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - entanglement within the OAA during the O&M stage (breeding and non-breeding season).
- Gannet:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season);
  - collision risk within the OAA during the O&M stage (breeding and non-breeding season); and
  - entanglement within the OAA during the O&M stage (breeding and non-breeding season)

6.2.9.6 For the above features **Table 6.42** provides information on the contemporaneous and latest count for relevant qualifying features which have been utilised for assessment of potential effects, where relevant.

Table 6.42 Forth Islands SPA contemporaneous and latest count for relevant qualifying features

Qualifying feature	Contemporaneous count (Burnell et al. 2023; breeding adults)	Latest count (SMP,2025; breeding adults)*
Kittiwake	9,084	14,216 (2024)
Razorbill	7,631	8,375 (2024)
Puffin	85,846	117,960 (2024)
Gannet	150,518	92,090 (2024)

Table Note: *Year of latest count provided in brackets.

6.2.9.7 Seasonal apportioning rates for each qualifying feature screened in for assessment are provided in **Table 6.43**. Further detail of how these apportioning rates have been derived is provided in **Appendix C**.

Table 6.43 Forth Islands SPA apportionment results to inform assessment

Qualifying feature	Breeding season apportioning rate				Non-breeding season apportionment rate (%)		
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	Return migration rate (%; collision risk only)	Post-breeding migration rate (%; collision risk only)	Non-breeding rate (%; distributional responses only)
Kittiwake	2.51%	10%	69.14%	1.56%	0.59%	0.45%	0.59%
Razorbill	N/A	N/A	N/A	N/A	N/A	N/A	0.72%
Puffin	46.52%	7%	94.07%	40.70%	N/A	N/A	26.83%
Gannet	55.99%	10%	68.36%	34.45%	31.27%	24.32%	24.32%

Assessment of potential effects from the project alone

Kittiwake

Distributional responses, collision risk and combined effects during the operation and maintenance stage

6.2.9.8 The assessment of the kittiwake feature of Forth Islands SPA is presented within **Section 6.2.21**. For all effect pathways assessed, **the potential for an AEoSI can confidently be ruled out for the Project alone**.

Razorbill

Distributional response during the operation and maintenance stage

6.2.9.9 The assessment of distributional response effects for the razorbill feature of Forth Islands SPA is presented within **Section 6.2.22**. As concluded within **Section 6.2.22**, **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Entanglement during the operation and maintenance stage

6.2.9.10 As summarised in **Section 6.2.16**, **the potential for an AEoSI in relation to entanglement during the O&M stage for the razorbill feature of Forth Islands SPA can confidently be ruled out.**

Puffin

Population trend

6.2.9.11 The population growth trends of the Forth Islands SPA puffin feature are based on census data within the SMP database (2025) (**Plate 6.6, Table 6.44, Table 6.45**) for the Isle of May count sector, which makes up the majority of the SPA population. Since citation in 1990, the Forth Island SPA puffin colonies have undergone significant growth, with the Isle of May colony reaching a peak count of 138,600 breeding adults in 2003. Between 2003-2009 a decline in population is recorded which may be linked to the reduction in adult survival noted at the colony during the same time period (Burnell *et al.* 2023). The recent colony trend has been relatively stable with minor fluctuations in population size between counts, with the latest 2024 count recording a total of 104,208 breeding adults at the Isle of May. No detailed consideration of the potential effect of HPAI on puffins is provided within Tremlett *et al.* (2024) due to low mortality from HPAI recorded for puffin.

Plate 6.6 Population trend for puffin within the Isle of May count sector from 1984 to 2024 (SMP, 2025)

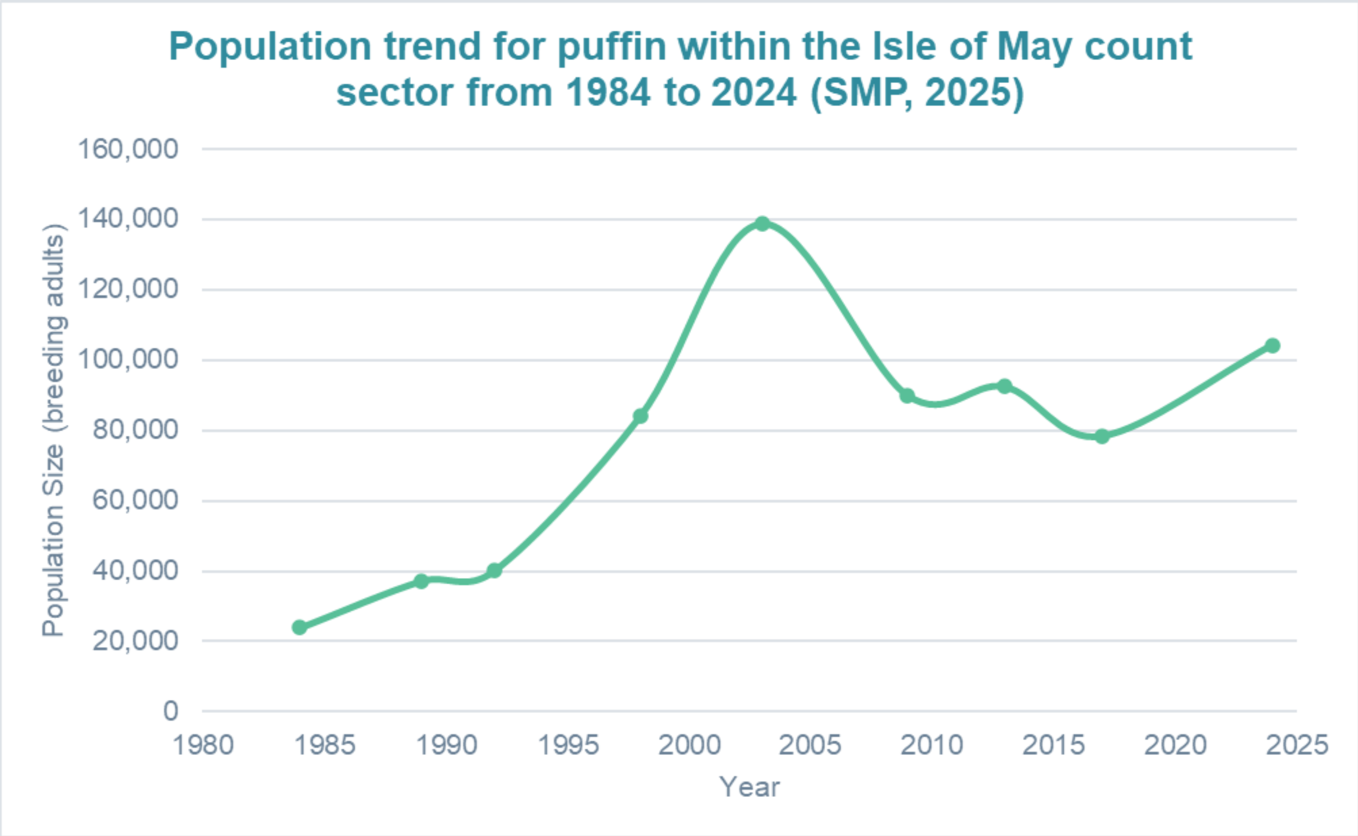

Table 6.44 Census data for puffin within the Isle of May count sector from 1984 to 2024

Year	Census Count								
	1984	1989	1992	1998	2003	2009	2013	2017	2024
Population (breeding adults)	24,000	37,256	40,212	84,000	138,600	89,942	92,400	78,400	104,208

Table 6.45 Annual compound growth rate for puffin within the Isle of May count sector from 1984 to 2024

Year	1984 to 2024	1998 to 2024	2003 to 2024	2009 to 2024	2013 to 2024	2013 to 2024
Change in population size (breeding adults)	80,208	20,208	-34,392	14,266	11,808	25,808
Annual compound growth rate (%)	3.74%	0.83%	-1.35%	0.99%	1.10%	4.15%

Distributional response during the operation and maintenance stage

6.2.9.12 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.46** and **Table 6.47**. These impact predictions are based on abundance and consequent mortality following both the Developer and guidance preferred displacement and mortality rates presented in **Table 6.6**, apportioned to the puffin feature of Forth Islands SPA using the apportioning rates presented in **Table 6.43** The appropriateness of the proposed displacement and mortality rates for the Developer and guidance approaches are summarised within **Section 6.2.4**

6.2.9.13 A displacement matrix is also presented within **Table 6.48** for the predicted annual breeding adult apportioned abundance for the puffin feature of Forth Islands SPA within the Project OAA plus 2km buffer.

Table 6.46 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the puffin feature of Forth Islands SPA following the Developer approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			50% Disp; 0 to 1% Mort (breeding adults per annum)	**Percentage point change in survival rate (%)**
Burnell *et al.* (2023)	85,846	Breeding season	0.00 to 1.13	0.000% to 0.001%
		Non-breeding season	0.00 to 0.07	0.000% to <0.001%
		Annual	0.00 to 1.19	0.000% to 0.001%
Latest count (2024)	117,960	Breeding season	0.00 to 1.13	0.000% to- 0.001%
		Non-breeding season	0.00 to 0.07	0.000% to <0.001%
		Annual	0.00 to 1.19	0.000% to 0.001%

Table 6.47 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the puffin feature of Forth Islands SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			60% Disp; 1 to 5% Mort (breeding adults per annum)*	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	85,846	Breeding season	4.06 to 6.76	0.005 - 0.008%
		Non-breeding season	0.08 to 0.24	<0.001%
		Annual	4.14 to 7.01	0.005% to 0.008%
Latest count (2024)	117,960	Breeding season	4.06 to 6.76	0.003% to 0.006%
		Non-breeding season	0.08 to 0.24	<0.001%
		Annual	4.14 to 7.01	0.004% to- 0.006%

Table Note: *As summarised in **Table 6.6**, a mortality rate of 3 to 5% has been applied during the breeding season and a mortality rate of 1 to 3% has been applied during the non-breeding season

6.2.9.14 As summarised in **Table 6.46** and **Table 6.47**, regardless of the approach taken the level of impacted predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.48 Forth Islands SPA puffin feature operation and maintenance stage displacement matrix

Displacement (%)	Mortality (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2	2
10	0	0	0	1	1	1	2	5	7	10	12	14	17	19	22	24
20	0	0	1	1	2	2	5	10	14	19	24	29	33	38	43	48
30	0	1	1	2	3	4	7	14	22	29	36	43	50	57	65	72
40	0	1	2	3	4	5	10	19	29	38	48	57	67	76	86	96
50	0	1	2	4	5	6	12	24	36	48	60	72	84	96	108	119
60	0	1	3	4	6	7	14	29	43	57	72	86	100	115	129	143
70	0	2	3	5	7	8	17	33	50	67	84	100	117	134	151	167

Displacement (%)	**Mortality (%)**															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
80	0	2	4	6	8	10	19	38	57	76	96	115	134	153	172	191
90	0	2	4	6	9	11	22	43	65	86	108	129	151	172	194	215
100	0	2	5	7	10	12	24	48	72	96	119	143	167	191	215	239

Entanglement during the operation and maintenance stage

6.2.9.15 As summarised in **Section 6.2.16**, **the potential for an AEoSI in relation to entanglement during the O&M stage for the puffin feature of Forth Islands SPA can confidently be ruled out.**

Gannet

Population trend

6.2.9.16 The population growth trends of the Forth Islands SPA gannet feature are based on census data within the SMP database (2025), Harris *et al.* (2023) and Burton *et al.* (2024) (**Plate 6.7, Table 6.49, Table 6.50**) The compound growth rates presented suggest the Forth Islands SPA in the long term has been on a stable increase in population size since 1990, though the colony is known to have been increasing for over 100 years (Jeglinski *et al.* 2022). Although the 2021 colony count is an extrapolation only, the reduction of growth rate predicted is likely to be consistent with the actual trend, as the colony (pre-HPAI) was considered close to carrying capacity in the early 2020s (Harris *et al.* 2023).

6.2.9.17 In 2022, the Forth Islands SPA gannet population was significantly impacted by HPAI, with 5,035 confirmed cases of dead gannets at the SPA and a significant reduction in colony size in 2022 (total of 42,454 birds recorded in June 2022) as reported in Lane *et al.* (2024). Counts undertaken in 2023 recorded a total of 103,688 birds, indicating an increase of 144% compared to the 2022 count and above the citation count, though still a marked reduction in size in contrast to the previous 2014 census (31% decline). A further census was undertaken in 2024, to further monitor potential effects of HPAI (Burton *et al.* 2024). No major mortality events were reported in 2024, it is unclear whether the colony has undergone further decline in population size between 2023-2024 or if the difference is down to the 2023 survey being an extrapolated count based on partial coverage (Burton *et al.* 2024).

Plate 6.7 Population Trend of the Gannet Feature of the Forth Islands SPA from 1985 to 2024 (SMP, 2025, Harris *et al*., 2023; Burton *et al*., 2024)

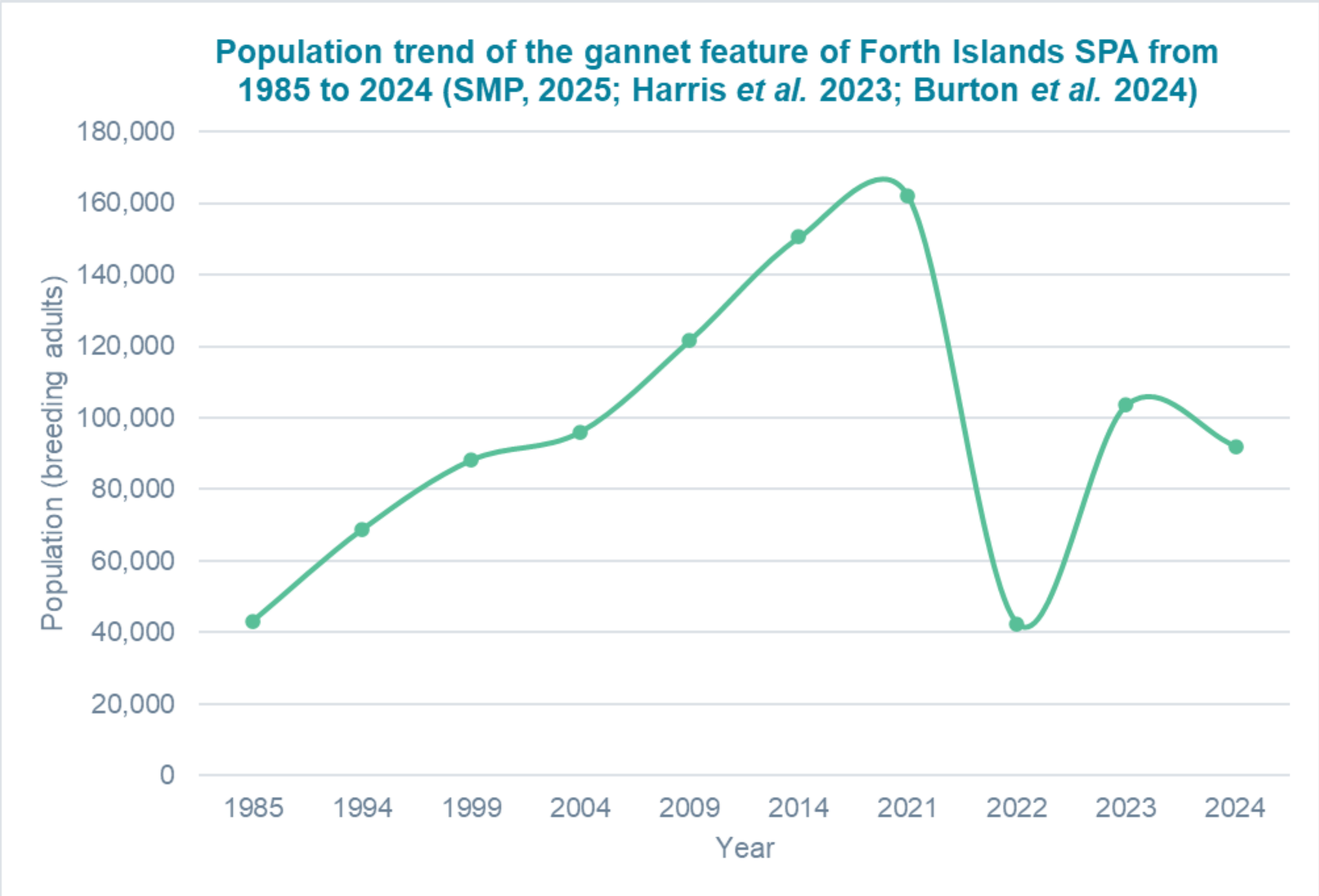

Table 6.49 Census data for the gannet feature of Forth Islands SPA between 1985 to 2024

Year	Census Count									
	1985	1994	1999	2004	2009	2014	2021	2022	2023	2024
Population (breeding adults)	43,182	68,794	88,220	96,130	121,706	150,518	162,000	42,454	103,688	92,090

Table 6.50 Annual compound growth rate for the gannet feature of Forth Islands SPA between 1985 to 2024

Year	1985 to 2024	1985 to 2014	1985 to 2004	2004 to 2014	2014 to 2021	2021 to 2024	2022 to 2024
Change in population size (breeding adults)	60,506	107,336	52,948	54,388	11,482	-69,910	49,636
Annual compound growth rate (%)	1.96%	4.40%	4.30%	4.59%	1.06%	-17.16%	47.28%

Distributional response during the operation and maintenance stage

6.2.9.18 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.51 and Table 6.52**. These impact predictions are based on abundance and consequent mortality following both the Developer and guidance preferred displacement and mortality rates presented in **Table 6.6**, apportioned to the gannet feature of the Forth Islands SPA using the apportioning rates presented in **Table 6.43**. The appropriateness of the proposed displacement and mortality rates for the Developer and guidance approaches are summarised within **Section 6.2.4**.

6.2.9.19 A displacement matrix is also presented within **Table 6.53** for the predicted annual breeding adult apportioned abundance for the gannet feature of Forth Islands SPA within the Project OAA plus 2km buffer.

Table 6.51 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the gannet feature of Forth Islands SPA following the Developer approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			60 to 80% Disp; 1% Mort (breeding adults per annum)*	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	150,518	Breeding season	1.33 to 1.77	0.001% to 0.001%
		Non-breeding season	0.44 to 0.59	0.000% to 0.000%
		Annual	1.77 to 2.36	0.001% to 0.002%
Latest count (2024)	92,090	Breeding season	1.33 to 1.77	0.001% to 0.002%
		Non-breeding season	0.44 to 0.59	0.000% to 0.001%
		Annual	1.77 to 2.36	0.002% to 0.003%

Table Note: * For the purposes of presenting the range of potential displacement effects the worst-case scenario of a 1% mortality rate only is presented. Please note however, as concluded within **Section 6.2.4**, there is potential that the consequential mortality rate could be less than 1%.

Table 6.52 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the gannet feature of Forth Islands SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			70% Disp; 1 - 3% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	150,518	Breeding season	1.55 to 4.64	0.001% to 0.003%
		Non-breeding season	0.52 to 1.55	0.000% to 0.001%
		Annual	2.07 to 6.20	0.001% to 0.004%
Latest count (2024)	92,090	Breeding season	1.55 to 4.64	0.002% to 0.005%
		Non-breeding season	0.52 to 1.55	0.001% to 0.002%
		Annual	2.07 to 6.20	0.002% to 0.007%

6.2.9.20 As summarised in **Table 6.51** and **Table 6.52**, regardless of the approach taken the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.53 Forth Islands SPA gannet feature operation and maintenance stage displacement matrix

Displacement (%)	Mortality (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	1	1	1	1	2	2	2	3	3
10	0	0	1	1	1	1	3	6	9	12	15	18	21	24	27	30
20	0	1	1	2	2	3	6	12	18	24	30	35	41	47	53	59
30	0	1	2	3	4	4	9	18	27	35	44	53	62	71	80	89
40	0	1	2	4	5	6	12	24	35	47	59	71	83	94	106	118
50	0	1	3	4	6	7	15	30	44	59	74	89	103	118	133	148
60	0	2	4	5	7	9	18	35	53	71	89	106	124	142	159	177
70	0	2	4	6	8	10	21	41	62	83	103	124	145	165	186	207

Displacement (%)	**Mortality (%)**															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
80	0	2	5	7	9	12	24	47	71	94	118	142	165	189	212	236
90	0	3	5	8	11	13	27	53	80	106	133	159	186	212	239	266
100	0	3	6	9	12	15	30	59	89	118	148	177	207	236	266	295

Collision risk during the operation and maintenance stage

6.2.9.21 The level of predicted impact in relation to collision risk during the O&M stage is provided in **Table 6.54.** These impact predictions are based on the modelled collision mortality presented within **Table 6.7**, apportioned to the gannet feature of the Forth Islands SPA using the apportioning rates presented in **Table 6.43**. There is no deviation between the preferred approach proposed by the Applicant and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised in **Section 6.2.5** and how this may affect the impact predictions presented.

Table 6.54 Summary of predicted collision risk during the operation and maintenance stage apportioned to the gannet feature of Forth Islands SPA following the guidance approach

Population count	Population size	Season	Predicted impact	
			Predicted collisions (breeding adults per annum)	**Percentage point change in survival rate (%)**
Burnell *et al.* (2023)	150,518	Breeding season	13.70	0.009%
		Return migration season	0.25	-
		Post-breeding migration season	0.57	-
		Total non-breeding season	0.83	0.001%
		Annual	14.53	0.010%
Latest count (2024)	92,090	Breeding season	13.70	0.015%
		Return migration season	0.25	-
		Post-breeding migration season	0.57	-
		Total non-breeding season	0.83	0.001%

Population count	Population size	Season	Predicted impact	
			Predicted collisions (breeding adults per annum)	Percentage point change in survival rate (%)
		Annual	14.53	0.016%

6.2.9.22 As summarised in **Table 6.54**, regardless of the approach taken the level of impacted predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to collision risk during the O&M stage can confidently be ruled out for the Project alone**.

Combined effects during the operation and maintenance stage

6.2.9.23 Due to the gannet feature of Forth Islands SPA being screened in for assessment of both distributional response and collision risk, there is potential for both effect pathways to impact the feature combined. Consideration of both impacts combined is presented within **Table 6.55** for the Developer approach to assessment of distributional responses, and **Table 6.56** for the guidance approach to assessment of distributional responses (there is no difference between the Developer and guidance approach for collision risk).

6.2.9.24 As is standard practice predicted displacement and collision consequent mortality have been added together to inform the level of predicted combined impact. It's important to note that simply adding both impacts together is highly likely to lead to an overestimate of impact, as a bird that is displaced cannot consequently collide with a WTG and vice versa. This overestimation is partially resolved for gannet via the inclusion of macro avoidance behaviour being accounted for when collision risk modelling, though to date NatureScot only recommend the inclusion of such behaviour in the non-breeding season.

Table 6.55 Summary of predicted combined distributional response and collision risk impact during the operation and maintenance stage apportioned to the gannet feature of Forth Islands SPA following the Developer approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			CRM + 60 to 80% Disp; 1% Mort (breeding adults per annum)*	Percentage point change in survival rate (%)
	150,518	Breeding season	15.03 to 15.47	0.010% to 0.010%

Population count	Population size (breeding adults)	Season	Predicted impact	
			CRM + 60 to 80% Disp; 1% Mort (breeding adults per annum)*	Percentage point change in survival rate (%)
Burnell *et al.* (2023)		Non-breeding season	1.27 to 1.42	0.001% to0.001%
		Annual	16.30 to 16.89	0.011% to 0.011%
Latest count (2024)	92,090	Breeding season	15.03 to 15.47	0.016% to 0.017%
		Non-breeding season	1.27 to 1.42	0.001% to 0.002%
		Annual	16.30 to 16.89	0.018% to 0.018%

Table Note: * For the purposes of presenting the range of potential displacement effects the worst-case scenario of a 1% mortality rate only is presented. Please note however, as concluded within **Section 6.2.4**, there is potential that the consequential mortality rate could be less than 1%.

Table 6.56 Summary of predicted combined distributional response and collision risk impact during the operation and maintenance stage apportioned to the gannet feature of Forth Islands SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			CRM + 70% Disp; 1 to 3% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	150,518	Breeding season	15.25 to 18.35	0.010% to 0.012%
		Non-breeding season	1.35 to 2.38	0.001% to 0.002%
		Annual	16.60 to 20.73	0.011% to 0.014%
Latest count (2024)	92,090	Breeding season	15.25 to 18.35	0.017% to 0.020%
		Non-breeding season	1.35 to 2.38	0.001% to 0.003%
		Annual	16.60 to 20.73	0.018% to 0.023%

6.2.9.25 In relation to the Developer approach presented in **Table 6.55**, the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. However, when considering the guidance approach summarised in **Table 6.56** the level of impact predicted annually or seasonally exceeds a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) further consideration of the predicted impact is required via PVA.

6.2.9.26 PVA has been undertaken for the 35-year operational lifetime of the Project and modelled using the latest count of 92,090 breeding adults. Outputs are presented in **Table 6.57** below, including the predicted median CGR and median CPS. PVA modelling was undertaken using density independent modelling, and therefore the CGR value is considered a more reliable metric than CPS values for interpreting impacts (see **Section 6.2.6**). For full details on PVA methodology, see **Appendix C**.

6.2.9.27 The known recent and historic growth trends of the gannet feature of Forth Islands SPA are presented within **Table 6.50**. When interpreting the PVA outputs presented within **Table 6.57**, it is important to consider the following points:

- The Forth Islands SPA have experienced long term population growth for over 100 years (Jeglinski *et al.* 2022). From 1985 to 2014 the colony has maintained a consistent growth rate of over 4% per annum (**Plate 6.7, Table 6.50**).
- Between 2014 and 2021, the growth rate reduced to just over 1% per annum. Although the 2021 colony count is an extrapolation only, the reduction of growth rate predicted is likely to be consistent with the actual trend, as the colony (pre-HPAI) was considered close to carrying capacity in the early 2020s (Harris et al. 2023).
- In 2022, the Forth Islands SPA gannet population was significantly impacted by HPAI, with a significant reduction in colony size in 2022 (Lane *et al.* 2024). Counts in 2023 recorded 103,688 birds, an increase of 144% compared to the 2022 count and above the citation count, although still lower than the previous 2014 census (31% decline). A further census undertaken in 2024 (Burton *et al.* 2024) recorded 92,090 birds, although it is unclear whether this count reflects a further decline between 2023-2024, variation in survey methodologies or redistribution of the population (Burton *et al.* 2024).
- When considering the historic consistent growth of all gannet populations over the last 50 years (Burnell *et al.* 2023), the impact of HPAI is not expected to affect the long-term integrity of the national site network significantly.
- The gannet feature of Forth Islands SPA is currently classified as being in favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.
- The potential effect predicted is highly likely to be a significant overestimate due to high degree of precaution within assessment of CRM (**Section 6.2.5**), no evidence to support a mortality rate of 3% for distributional response effects (**Section 6.2.4**) and simplistic additive manner of considering combined effects.

6.2.9.28 the predicted reduction in growth rate presented within **Table 6.57** is sufficiently small that it would be indistinguishable from natural fluctuations. Therefore, **the potential for an AEoSI in relation to combined distributional response effects and collision risk impacts during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.57 PVA results for annual predicted impacts for the Project alone apportioned to the gannet feature of Forth Islands SPA

Scenario modelled	Annual increase in mortality (breeding adults)	Density independent counterfactual metric (35yrs)			
		Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35yrs (%)
70% Displacement , 3% mortality	20.7	1.000	0.03	0.991	0.94

Entanglement during the operation and maintenance stage

6.2.9.29 As summarised in **Section 6.2.16**, **the potential for an AEoSI in relation to entanglement during the O&M stage for the gannet feature of Forth Islands SPA can confidently be ruled out.**

6.2.10 Fowlsheugh SPA

Site description

6.2.10.1 As identified at screening stage the Fowlsheugh SPA is located approximately 167km from the OAA. Given the distance from the SPA, the Project does not directly overlap with the SPA boundary or any known functionally linked areas.

6.2.10.2 The Fowlsheugh SPA site description is as follows (NatureScot, 2024): *"Fowlsheugh SPA, located 4 km south of Stonehaven on the east coast of Aberdeenshire in north-east Scotland, is a 10.15 ha stretch of sheer cliffs, between 30m and 60m high, cut mostly from basalt and conglomerate rocks of Old Red Sandstone age. The boundary of the SPA overlaps with the boundaries of Fowlsheugh SSSI. The seaward extension extends 2 km into the marine environment and includes the seabed, water column and surface."*

Conservation objectives and condition assessment

6.2.10.3 The overarching conservation objectives for the SPA are listed below. Those relevant to assessment are highlighted bold, based on consideration of how the identified impact pathways may affect the qualifying features screened in for assessment:

- To ensure that the qualifying features of the Fowlsheugh SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the Fowlsheugh SPA is restored in the context of environmental changes by meeting the following objectives for each feature:**
  - **the population of the qualifying features are viable components of the Fowlsheugh SPA;**
  - the distribution of the qualifying features is maintained, or where appropriate restored, throughout the site by avoiding significant disturbance of the species; and

- the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at Fowlsheugh SPA.

6.2.10.4 The condition status of qualifying features screened in for assessment **Table 3.1** are as follows:

- The latest condition assessment for the kittiwake feature of Fowlsheugh SPA was completed by NatureScot in 2024. The kittiwake feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the razorbill feature of Fowlsheugh SPA was completed by NatureScot in 2024. The razorbill feature was classified to be in a favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.
- The latest condition assessment for the fulmar feature of Fowlsheugh SPA was completed by NatureScot in 2024. The fulmar feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.

Qualifying features requiring assessment

6.2.10.5 The qualifying features of Fowlsheugh SPA where the potential for a LSE was concluded for identified effect pathways, seasons and Project stages are as follows:

- Kittiwake:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - collision risk within the OAA during the O&M stage (breeding and non-breeding season).
- Razorbill:
  - distributional response within the OAA during the O&M stage (non-breeding season); and
  - entanglement within the OAA during the O&M stage (non-breeding season).
- Fulmar:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season).

6.2.10.6 For the above features **Table 6.58** provides information on the contemporaneous and latest count for relevant qualifying features which have been utilised for assessment of potential effects, where relevant.

Table 6.58 Fowlsheugh SPA contemporaneous and latest count for relevant qualifying features

Qualifying feature	Contemporaneous count (Burnell *et al.* 2023; breeding adults)	Latest count (SMP,2025; breeding adults)*
Kittiwake	28,078	30,966 (2023)
Razorbill	18,844	20,869

Table Note: *Year of latest count provided in brackets.

6.2.10.7 Seasonal apportioning rates for each qualifying feature screened in for assessment are provided in **Table 6.59**. Further detail of how these apportioning rates have been derived is provided in **Appendix C**.

Table 6.59 Fowlsheugh SPA apportionment results to inform assessment

Qualifying feature	Breeding season apportioning rate				Non-breeding season apportionment rate (%)		
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	Return migration rate (%; collision risk only)	Post-breeding migration rate (%; collision risk only)	Non-breeding rate (%; distributional responses only)
Kittiwake	12.62%	10%	69.14%	7.85%	1.78%	1.35%	1.78%
Razorbill	N/A	N/A	N/A	N/A	N/A	N/A	0.97%

Assessment of potential effects from the project alone

Kittiwake

Population trend

6.2.10.8 The population growth trends of the Fowlsheugh SPA kittiwake feature are based on census data within the SMP database (2025) (**Plate 6.8, Table 6.60, Table 6.61**). From 1992 through to 2012, the colony underwent significant decline in population size before stabilising in 2012. The recent colony trend has been relatively stable with only minor fluctuations in population size report pre and post HPAI. Within Tremlett *et al.* (2024) a positive increase in population size of 64% is presented, though it is unclear where the baseline count (pre-HPAI) is derived from.

Plate 6.8 Population trend for the kittiwake feature of Fowlsheugh SPA from 1986 to 2023 (SMP, 2025)

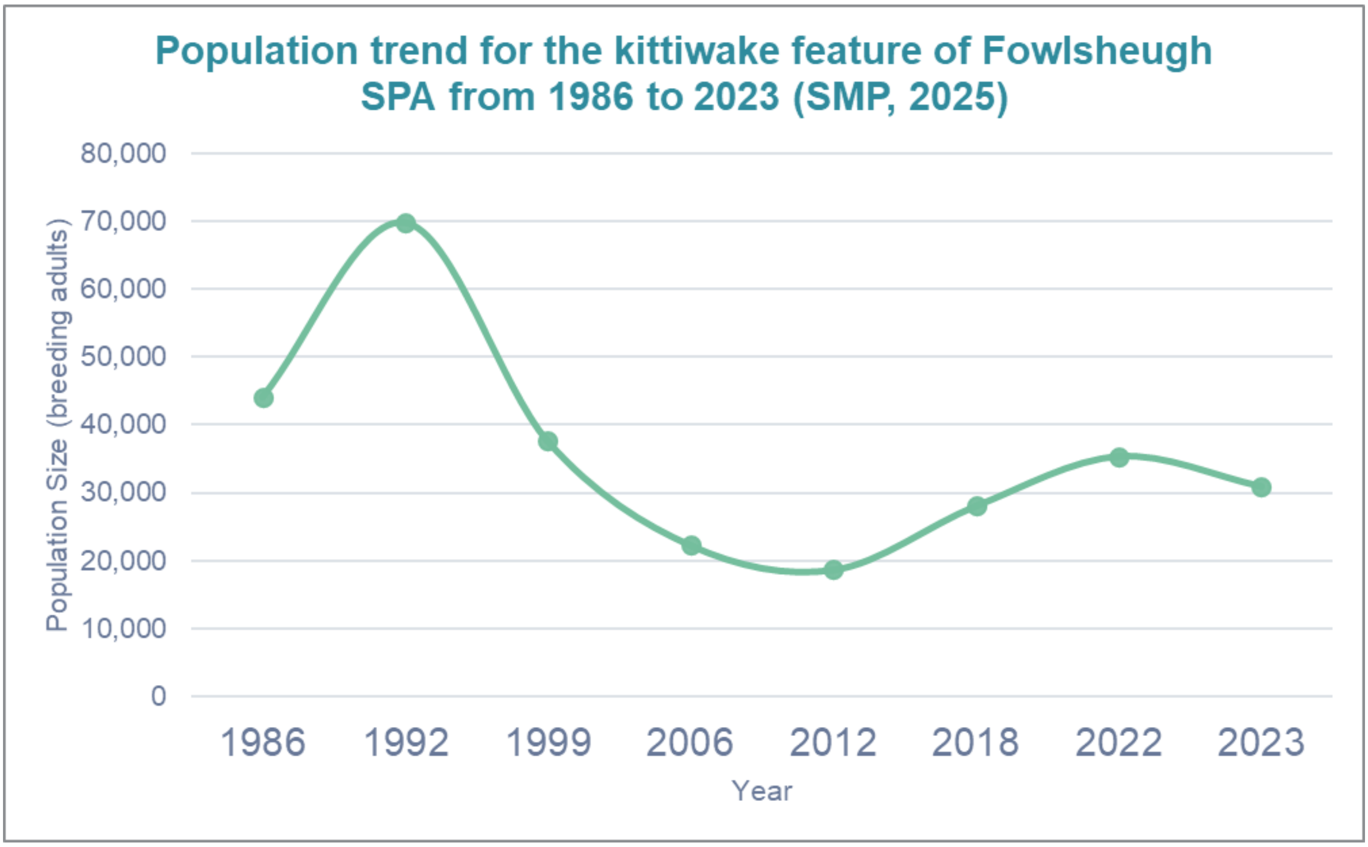

Table 6.60 Census data for the kittiwake feature of Fowlsheugh SPA between 1986 to 2023

Year	Census Count							
	1986	**1992**	**1999**	**2006**	**2012**	**2018**	**2022**	**2023**
Population (breeding adults)	44,102	69,744	37,600	22,280	18,674	28,078	35,380	30,966

Table 6.61 Annual compound growth rate for the kittiwake feature of Fowlsheugh SPA between 1986 to 2023

Year	1986 to 2023	1986 to 1992	1992 to 2012	2012 to 2022	2022 to 2023
Change in population size (breeding adults)	-13,136	25,642	-51,070	16,706	-4,414
Annual compound growth rate (%)	-0.95%	7.94%	-6.38%	6.60%	-12.48%

Distributional response during the operation and maintenance stage

6.2.10.9 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.62**. These impact predictions are based on abundance and consequent mortality following the guidance preferred displacement and mortality rates presented in **Table 6.6**, apportioned to the kittiwake feature of Fowlsheugh SPA using the apportioning rates presented in **Table 6.59**. The appropriateness of the proposed displacement and mortality rates the guidance approach are summarised within **Section 6.2.4**

6.2.10.10 A displacement matrix is also presented within **Table 6.63** for the predicted annual breeding adult apportioned abundance for the kittiwake feature of the Fowlsheugh SPA within the Project OAA plus 2km buffer.

Table 6.62 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the kittiwake feature of Fowlsheugh SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			30% Disp; 1 to 3% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	28,078	Breeding season	0.21 to 0.63	0.001% to 0.002%
		Non-breeding season	0.01 to 0.02	<0.001%
		Annual	0.22 to 0.65	0.001% to 0.002%
Latest count (2023)	30,966	Breeding season	0.21 to 0.63	0.001% to 0.002%
		Non-breeding season	0.01 to 0.02	<0.001%
		Annual	0.22 to 0.65	0.001% to 0.002%

6.2.10.11 As summarised in **Table 6.62**, the level of impacted predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.63 Fowlsheugh SPA kittiwake feature operation and maintenance stage displacement matrix

Displacement (%)	Mortality (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
10	0	0	0	0	0	0	1	1	2	3	4	4	5	6	7	7
20	0	0	0	0	1	1	1	3	4	6	7	9	10	12	13	14
30	0	0	0	1	1	1	2	4	7	9	11	13	15	17	20	22
40	0	0	1	1	1	1	3	6	9	12	14	17	20	23	26	29
50	0	0	1	1	1	2	4	7	11	14	18	22	25	29	33	36
60	0	0	1	1	2	2	4	9	13	17	22	26	30	35	39	43
70	0	1	1	2	2	3	5	10	15	20	25	30	35	41	46	51

Displacement (%)	**Mortality (%)**															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
80	0	1	1	2	2	3	6	12	17	23	29	35	41	46	52	58
90	0	1	1	2	3	3	7	13	20	26	33	39	46	52	59	65
100	0	1	1	2	3	4	7	14	22	29	36	43	51	58	65	72

Collision risk during the operation and maintenance stage

6.2.10.12 The level of predicted impact in relation to collision risk during the O&M stage is provided in **Table 6.14.** These impact predictions are based on the modelled collision mortality presented within **Table 6.64** apportioned to the kittiwake feature of Fowlsheugh SPA using the apportioning rates presented in **Table 6.9.** There is no deviation between the preferred approach proposed by the Applicant and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented, it is important to recognise the uncertainty and limitations summarised in **Section 6.2.5** and how this may affect the impact predictions presented.

Table 6.64 Summary of predicted collision risk during the operation and maintenance stage apportioned to the kittiwake feature of Fowlsheugh SPA following the guidance approach

Population count	Population size	Season	Predicted impact	
			Predicted collisions (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	28,078	Breeding season	1.77	0.006%
		Return migration season	0.18	-
		Post-breeding migration season	0.08	-
		Total non-breeding season	0.26	0.001%
		Annual	2.03	0.007%
Latest count (2023)	30,966	Breeding season	1.77	0.006%
		Return migration season	0.18	-
		Post-breeding migration season	0.08	-
		Total non-breeding season	0.26	0.001%
		Annual	2.03	0.007%

6.2.10.13 As summarised in **Table 6.62**, regardless of the approach taken the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to collision risk during the O&M stage can confidently be ruled out for the Project alone**.

Combined effects during the operation and maintenance stage

6.2.10.14 Due to the kittiwake feature of Fowlsheugh SPA being screened in for assessment of both distributional response and collision risk, there is potential for both effect pathways to impact the feature combined. Consideration of both impacts combined is presented within **Table 6.65** for the guidance approach to assessment of distributional responses.

6.2.10.15 As is standard practice predicted displacement and collision consequent mortality have been added together to inform the level of predicted combined impact. It is important to note that simply adding both impacts together is highly likely to lead to an overestimate of impact, as a bird that is displaced cannot consequently collide with a WTG and vice versa.

Table 6.65 Summary of predicted combined distributional response and collision risk impact during the operation and maintenance stage apportioned to the kittiwake feature of Fowlsheugh SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted Impact	
			CRM + 30% Disp; 1 to 3% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	28,078	Breeding season	1.98 to 2.40	0.007% to 0.009%
		Non-breeding season	0.27 to 0.28	0.001% to 0.001%
		Annual	2.25 to 2.68	0.008% to 0.010%
Latest count (2023)	30,966	Breeding season	1.98 to 2.40	0.006% to 0.008%
		Non-breeding season	0.27 to 0.28	0.001% to 0.001%
		Annual	2.25 to 2.68	0.007% to 0.009%

6.2.10.16 As summarised in **Table 6.65** the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to combined collision risk and distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Razorbill

Distributional response during the operation and maintenance stage

6.2.10.17 The assessment of distributional response effects for the razorbill feature of Forth Islands SPA is presented within **Section 6.2.22** As concluded within **Section 6.2.22 the potential for an AEoSI in relation to distributional response effects during the O&M stage can be confidently ruled out for the Project alone**.

Entanglement during the operation and maintenance stage

6.2.10.18 As summarised in **Section 6.2.16 the potential for an AEoSI in relation to entanglement during the O&M stage for the razorbill feature of Fowlsheugh SPA can confidently be ruled out.**

Fulmar

Distributional response during the operation and maintenance stage

6.2.10.19 The assessment of distributional response effects for the fulmar feature of Fowlsheugh SPA is presented within **Section 6.2.17**. As concluded within **Section 6.2.17**, **the potential for an AEoSI in relation to distributional response effects during the O&M stage can be confidently ruled out for the Project alone**.

6.2.11 East Caithness Cliffs SPA

Site description

6.2.11.1 As identified at screening stage the East Caithness Cliffs SPA is located approximately 159km from the OAA. Given the distance from the SPA, the Project does not directly overlap with the SPA boundary or any known functionally linked areas.

6.2.11.2 The East Caithness Cliffs SPA site description is as follows (NatureScot, 2024): *"East Caithness Cliffs SPA is of special nature conservation and scientific importance within Britain and the European Community for supporting very large populations of breeding seabirds. It includes most of the sea-cliff areas between Wick and Helmsdale on the north-east coast of the Scottish mainland. The boundary of the SPA overlaps either partly or wholly with the following SSSI sites: Castle of Old Wick to Craig Hammel SSSI, Craig Hammel to Sgaps Geo SSSI, Dunbeath to Sgaps Geo SSSI, Berriedale Cliffs SSSI, Ousdale Burn SSSI and Helmsdale Coast SSSI. The seaward extension extends approximately 2km into the marine environment to include the seabed, water column and surface."*

Conservation objectives and condition assessment

6.2.11.3 The overarching conservation objectives for the SPA are listed below. Those relevant to assessment are highlighted bold, based on consideration of how the identified impact pathways may affect the qualifying features screened in for assessment:

- To ensure that the qualifying features of the East Caithness Cliffs SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the East Caithness Cliffs SPA is restored in the context of environmental changes by meeting the following objectives for each feature:**
  - **the populations of the qualifying features are viable components of the East Caithness Cliffs SPA;**
  - the distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at East Caithness Cliffs SPA.

6.2.11.4 The condition status of qualifying features screened in for assessment (**Table 3.1**) are as follows:

- The latest condition assessment for the great black-backed gull feature of East Caithness Cliffs SPA was completed by NatureScot in 2016. The great black-backed gull feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the kittiwake feature of East Caithness Cliffs SPA was completed by NatureScot in 2016. The kittiwake feature was classified to be in a favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.
- The latest condition assessment for the razorbill feature of East Caithness Cliffs SPA was completed by NatureScot in 2016. The razorbill feature was classified to be in a favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.
- The latest condition assessment for the fulmar feature of East Caithness Cliffs SPA was completed by NatureScot in 2016. The fulmar feature was classified to be in a favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.

Qualifying features requiring assessment

6.2.11.5 The qualifying features of East Caithness Cliffs SPA where the potential for a LSE was concluded for identified effect pathways, seasons and Project stages are as follows:

- Great black-backed gull:
  - collision risk within the OAA during the O&M stage (non-breeding season).
- Kittiwake:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - collision risk within the OAA during the O&M stage (breeding and non-breeding season).
- Razorbill:
  - distributional response within the OAA during the O&M stage (non-breeding season); and
  - entanglement within the OAA during the O&M stage (non-breeding season).
- Fulmar:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season).

6.2.11.6 For the above features **Table 6.66** provides information on the contemporaneous and latest count for relevant qualifying features which have been utilised for assessment of potential effects, where relevant.

Table 6.66 East Caithness Cliffs SPA contemporaneous and latest count for relevant qualifying features

Qualifying feature	Contemporaneous count (Burnell *et al.* 2023; breeding adults)	Latest count (SMP,2025; breeding adults)*
Great black-backed gull	532	278 (2024)
Kittiwake	48,958	36,532 (2024)
Razorbill	40,373	33,023 (2024)

Table Note: *Year of latest count provided in brackets.

6.2.11.7 Seasonal apportioning rates for each qualifying feature screened in for assessment are provided in **Table 6.67**. Further detail of how these apportioning rates have been derived is provided in **Appendix C**.

Table 6.67 East Caithness Cliffs SPA apportionment results to inform assessment

Qualifying feature	Breeding season apportioning rate				Non-breeding season apportionment rate (%)			
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	Return migration rate (%; collision risk only)	Post-breeding migration rate (%; collision risk only)	Non-breeding rate (%; collision risk only)	Non-breeding rate (%; distributional responses only)
Great black-backed gull	N/A	N/A	N/A	N/A	N/A	N/A	0.19%	N/A
Kittiwake	23.25%	10%	69.14%	14.47%	7.72%	5.84%	N/A	7.72%
Razorbill	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.43%

Assessment of potential effects from the project alone

Great black-backed gull

Collision risk during the operation and maintenance stage

6.2.11.8 The assessment of collision risk for the great black-backed gull feature of East Caithness Cliffs SPA is presented within **Section 6.2.20**. As concluded within **Section 6.2.22**, **the potential for an AEoSI in relation to collision risk during the O&M stage can confidently be ruled out for the Project alone**.

Kittiwake

Population trend

6.2.11.9 The population growth trends of the East Caithness Cliffs SPA kittiwake feature are based on census data within the SMP database (2025) **(Plate 6.9, Table 6.68, Table 6.69**). The kittiwake feature of East Caithness Cliffs SPA has been in continued decline since the early 2000s and appears to remain in decline based on the latest count in 2024. Due to the 2024 colony count being unavailable at the time of the HPAI review undertaken by Tremlett *et al.* (2024), potential effects of HPAI on East Caithness Cliffs SPA kittiwake feature are uncertain.

Plate 6.9 Population trend for the kittiwake feature of East Caithness Cliffs SPA from 1977 to 2024 (SMP, 2025)

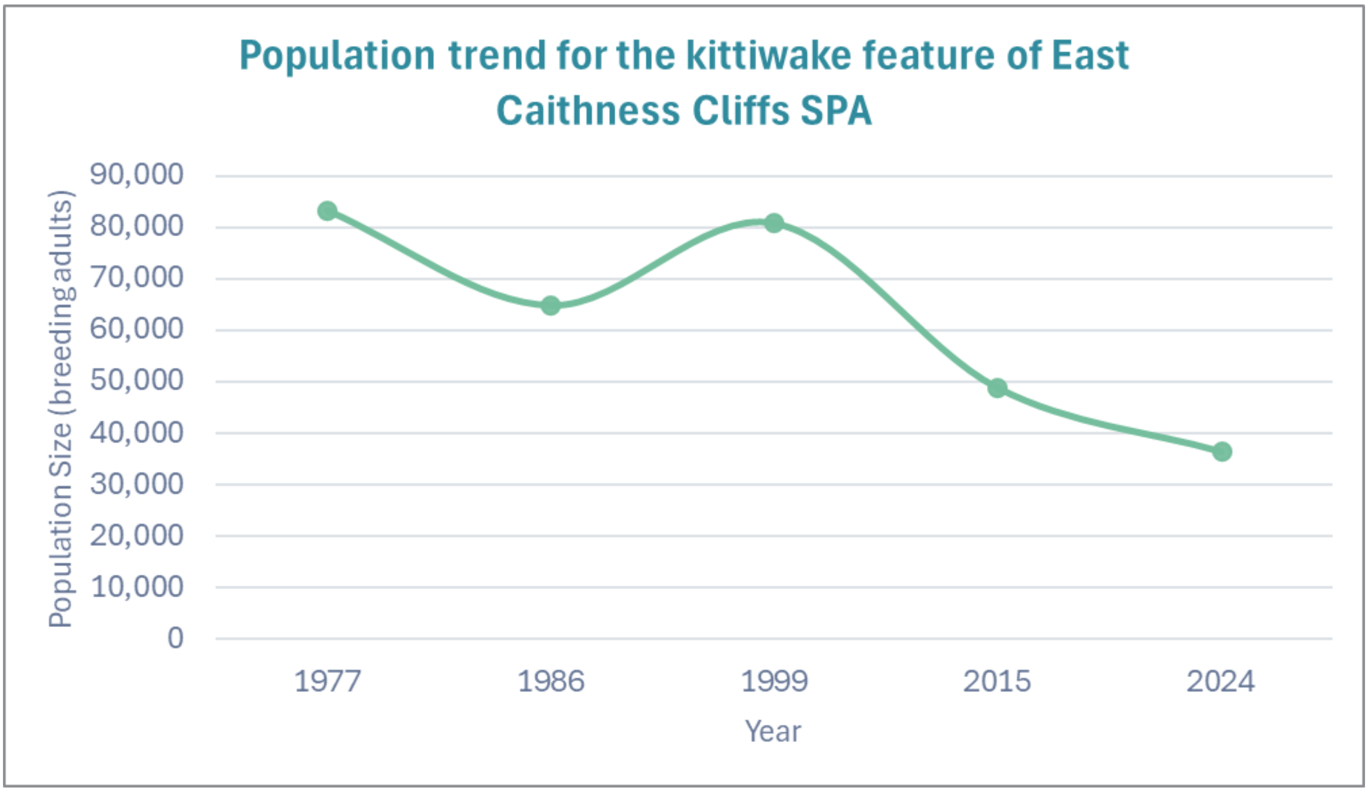

Table 6.68 Census data for the kittiwake feature of East Caithness Cliffs SPA between 1977 to 2024

Year	Census Count				
	1977	1986	1999	2015	2024
Population (breeding adults)	83,384	64,93	80,900	48,920	36,532

Table 6.69 Annual compound growth rate for the kittiwake feature of East Caithness Cliffs SPA between 1977 to 2024

Year	1977 to 2024	1977 to 1986	1986 to 1999	1999 to 2024	2015 to 2024
Change in population size (breeding adults)	-34,464	-18,452	15,968	-44,368	-12,388
Annual compound growth rate (%)	-1.13%	-2.74%	1.71%	-3.13%	-3.19%

Distributional response during the operation and maintenance stage

6.2.11.10 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.70.** These impact predictions are based on abundance and consequent mortality following the guidance preferred displacement and mortality rates presented in **Table 6.6,** apportioned to the kittiwake feature of East Caithness Cliffs SPA using the apportioning rates presented in **Table 6.67**. The appropriateness of the proposed displacement and mortality rates the guidance approach are summarised within **Section 6.2.4**.

6.2.11.11 A displacement matrix is also presented within **Table 6.71** for the predicted annual breeding adult apportioned abundance for the kittiwake feature of the East Caithness Cliffs SPA within the Project OAA plus 2km buffer.

Table 6.70 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the kittiwake feature of East Caithness Cliffs SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			30% Disp; 1 to 3% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	48,958	Breeding season	0.39 to 1.16	0.001% to 0.002%
		Non-breeding season	0.03 to 0.10	<0.001%
		Annual	0.42 to 1.26	0.001% to 0.003%
Latest count (2024)	36,562	Breeding season	0.39 to 1.16	0.001% to 0.003%
		Non-breeding season	0.03 to 0.10	<0.001%
		Annual	0.42 to 1.26	0.001% to 0.003%

6.2.11.12 As summarised in **Table 6.70,** the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.71 East Caithness Cliffs SPA kittiwake feature operation and maintenance stage displacement matrix

Displacement (%)	Mortality (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
10	0	0	0	0	1	1	1	3	4	6	7	8	10	11	13	14
20	0	0	1	1	1	1	3	6	8	11	14	17	20	22	25	28
30	0	0	1	1	2	2	4	8	13	17	21	25	29	34	38	42
40	0	1	1	2	2	3	6	11	17	22	28	34	39	45	50	56
50	0	1	1	2	3	3	7	14	21	28	35	42	49	56	63	70
60	0	1	2	3	3	4	8	17	25	34	42	50	59	67	76	84
70	0	1	2	3	4	5	10	20	29	39	49	59	69	78	88	98

Displacement (%)	**Mortality (%)**															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
80	0	1	2	3	4	6	11	22	34	45	56	67	78	90	101	112
90	0	1	3	4	5	6	13	25	38	50	63	76	88	101	113	126
100	0	1	3	4	6	7	14	28	42	56	70	84	98	112	126	140

Collision risk during the operation and maintenance stage

6.2.11.13 The level of predicted impact in relation to collision risk during the O&M stage is provided in **Table 6.72**. These impact predictions are based on the modelled collision mortality presented within **Table 6.7**, apportioned to the kittiwake feature of East Caithness Cliffs SPA using the apportioning rates presented in **Table 6.67.** There is no deviation between the preferred approach proposed by the Applicant and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised in **Section 6.2.5** and how this may affect the impact predictions presented.

Table 6.72 Summary of predicted collision risk during the operation and maintenance stage apportioned to the kittiwake feature of East Caithness Cliffs SPA following the guidance approach

Population count	Population size	Season	Predicted impact	
			Predicted collisions (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	48,958	Breeding season	3.26	0.007%
		Return migration season	0.80	-
		Post-breeding migration season	0.33	-
		Total non-breeding season	1.13	0.002%
		Annual	4.39	0.009%
Latest count (2024)	36,562	Breeding season	3.26	0.009%
		Return migration season	0.80	-
		Post-breeding migration season	0.33	-
		Total non-breeding season	1.13	0.003%
		Annual	4.39	0.012%

6.2.11.14 As summarised in **Table 6.72**, regardless of the approach taken the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to collision risk during the O&M stage can confidently be ruled out for the Project alone.**

Combined effects during the operation and maintenance stage

6.2.11.15 Due to the kittiwake feature of East Caithness Cliffs SPA being screened in for assessment of both distributional response and collision risk, there is potential for both pathways to lead to effects on the feature combined. Consideration of both impacts combined is presented within **Table 6.73** for the guidance approach to assessment of distributional responses.

6.2.11.16 As is standard practice predicted displacement and collision consequent mortality have been added together to inform the level of predicted combined impact. It is important to note that simply adding both impacts to together is highly likely to lead to an overestimate of impact, as a bird that is displaced cannot consequently collide with a WTG and vice versa.

Table 6.73 Summary of predicted combined distributional response and collision risk impact during the operation and maintenance stage apportioned to the kittiwake feature of East Caithness Cliffs SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			CRM + 30% Disp; 1 to 3% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	48,958	Breeding season	3.65 to 4.42	0.007% to 0.009%
		Non-breeding season	1.17 to 1.23	0.002% to 0.003%
		Annual	4.81 to 5.65	0.010% to 0.012%
Latest count (2024)	36,562	Breeding season	3.65 to 4.42	0.010% to 0.012%
		Non-breeding season	1.17 to 1.23	0.003% to 0.003%
		Annual	4.81 to 5.65	0.014% to 0.015%

6.2.11.17 As summarised in **Table 6.73**, the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to combined collision risk and distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Razorbill

Distributional response during the operation and maintenance stage

6.2.11.18 The assessment of distributional response effects for the razorbill feature of East Caithness Cliffs SPA is presented within **Section 6.2.22**. As concluded within **Section 6.2.22**, **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Entanglement during the operation and maintenance stage

6.2.11.19 As summarised in **Section 6.2.16**, **the potential for an AEoSI in relation to entanglement during the O&M stage for the razorbill feature of East Caithness Cliffs SPA can confidently be ruled out.**

Fulmar

Distributional response during the operation and maintenance stage

6.2.11.20 The assessment of distributional response effects for the fulmar feature of East Caithness Cliffs SPA is presented within **Section 6.2.17**. As concluded within **Section 6.2.17**, **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

6.2.12 Copinsay SPA

Site description

6.2.12.1 As identified at screening stage the Copinsay SPA is located approximately 145km from the OAA. Given the distance from the SPA, the Project does not directly overlap with the SPA boundary or any known functionally linked areas.

6.2.12.2 The Copinsay SPA site description is as follows (NatureScot, 2024): *"The Copinsay SPA comprises a group of islands 4km off the east coast of Orkney Mainland. The islands have a cliffed rocky coastline and maritime vegetation that support large colonies of breeding seabirds. The boundary of the SPA encompasses Copinsay SSSI, and the seaward extension extends approximately 2km into the marine environment to include the seabed, water column and surface.*

Conservation objectives and condition assessment

6.2.12.3 The overarching conservation objectives for the SPA are listed below. Those relevant to assessment are highlighted bold, based on consideration of how the identified impact pathways may affect the qualifying features screened in for assessment:

- To ensure that the qualifying features of the Copinsay SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the Copinsay SPA is restored in the context of environmental changes by meeting the following objectives for each feature:**
  - **the populations of the qualifying features are viable components of the Copinsay SPA;**
  - the distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at Copinsay SPA.

6.2.12.4 The condition status of qualifying features screened in for assessment (**Table 3.1**) are as follows:

- The latest condition assessment for the great black-backed gull feature of Copinsay SPA was completed by NatureScot in 2024. The great black-backed gull feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.

- The latest condition assessment for the kittiwake feature of Copinsay SPA was completed by NatureScot in 2024. The kittiwake feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the guillemot feature of Copinsay SPA was completed by NatureScot in 2024. The guillemot feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the fulmar feature of Copinsay SPA was completed by NatureScot in 2024. The fulmar feature was classified to be in a favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.

Qualifying features requiring assessment

6.2.12.5 The qualifying features of Copinsay SPA where the potential for a LSE was concluded for identified effect pathways, seasons and Project stages are as follows:

- Great black-backed gull:
  - collision risk within the OAA during the O&M stage (non-breeding season).
- Kittiwake:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - collision risk within the OAA during the O&M stage (breeding and non-breeding season).
- Guillemot:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - entanglement within the OAA during the O&M stage (breeding and non-breeding season).
- Fulmar:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season).

6.2.12.6 For the above features **Table 6.74** provides information on the contemporaneous and latest count for relevant qualifying features which have been utilised for assessment of potential effects, where relevant.

Table 6.74 Copinsay SPA contemporaneous and latest count for relevant qualifying features

Qualifying feature	Contemporaneous count (Burnell *et al.* 2023; breeding adults)	Latest count (SMP,2025; breeding adults)*
Great black-backed gull	134	97 (2023-2024)
Kittiwake	1,910	670 (2024)
Guillemot	24,761	10,991 (2015-2023)

Table Note: *Year of latest count provided in brackets.

6.2.12.7 Seasonal apportioning rates for each qualifying feature screened in for assessment are provided in **Table 6.75**. Further detail of how these apportioning rates have been derived is provided in **Appendix C**.

Table 6.75 Copinsay SPA apportionment results to inform assessment

Qualifying feature	Breeding season apportioning rate				Non-breeding season apportionment rate (%)			
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	Return migration rate (%; collision risk only)	Post-breeding migration rate (%; collision risk only)	Non-breeding rate (%; collision risk only)	Non-breeding rate (%; distributional responses only)
Great black-backed gull	N/A	N/A	N/A	N/A	N/A	N/A	0.24%	N/A
Kittiwake	0.73%	10%	69.14%	0.45%	0.13%	0.10%	N/A	0.13%
Guillemot	12.12%	7%	60.65%	6.84%	N/A	N/A	N/A	6.84%

Assessment of potential effects from the project alone

Great black-backed gull

Collision risk during the operation and maintenance stage

6.2.12.8 The assessment of collision risk for the great black-backed gull feature of Copinsay SPA is presented within **Section 6.2.20**. As concluded within **Section 6.2.22**, **the potential for an AEoSI in relation to collision risk during the O&M stage can confidently be ruled out for the Project alone**.

Kittiwake

Distributional responses, collision risk and combined effects during the operation and maintenance stage

6.2.12.9 The assessment of the kittiwake feature of Copinsay SPA is presented within **Section 6.2.21**. For all effect pathways assessed, **the potential for an AEoSI can confidently be ruled out for the Project alone**.

Guillemot

Population trend

6.2.12.10 The population growth trends of the Copinsay SPA guillemot feature are based on census data within the SMP database (2025) **(Plate 6.10, Table 6.76, Table 6.77**). Between 1986 and 2005 a significant decline was recorded. From 2005-2023, the population size has fluctuated between surveys with an overall minor positive growth trend. The effect of HPAI on guillemot colonies in Scotland varied considerably, though an overall decline of 56% was recorded between pre and post HPAI counts for Copinsay SPA (Tremlett *et al.* 2024). However, it is unclear to what degree this is due to HPAI, or if the change is related to other factors (such as population redistribution, adverse weather, change in prey availability or survey error) (Tremlett *et al.* 2024).

Plate 6.10 Population trend of the guillemot feature of Copinsay SPA from 1986 to 2025 (SMP, 2025)

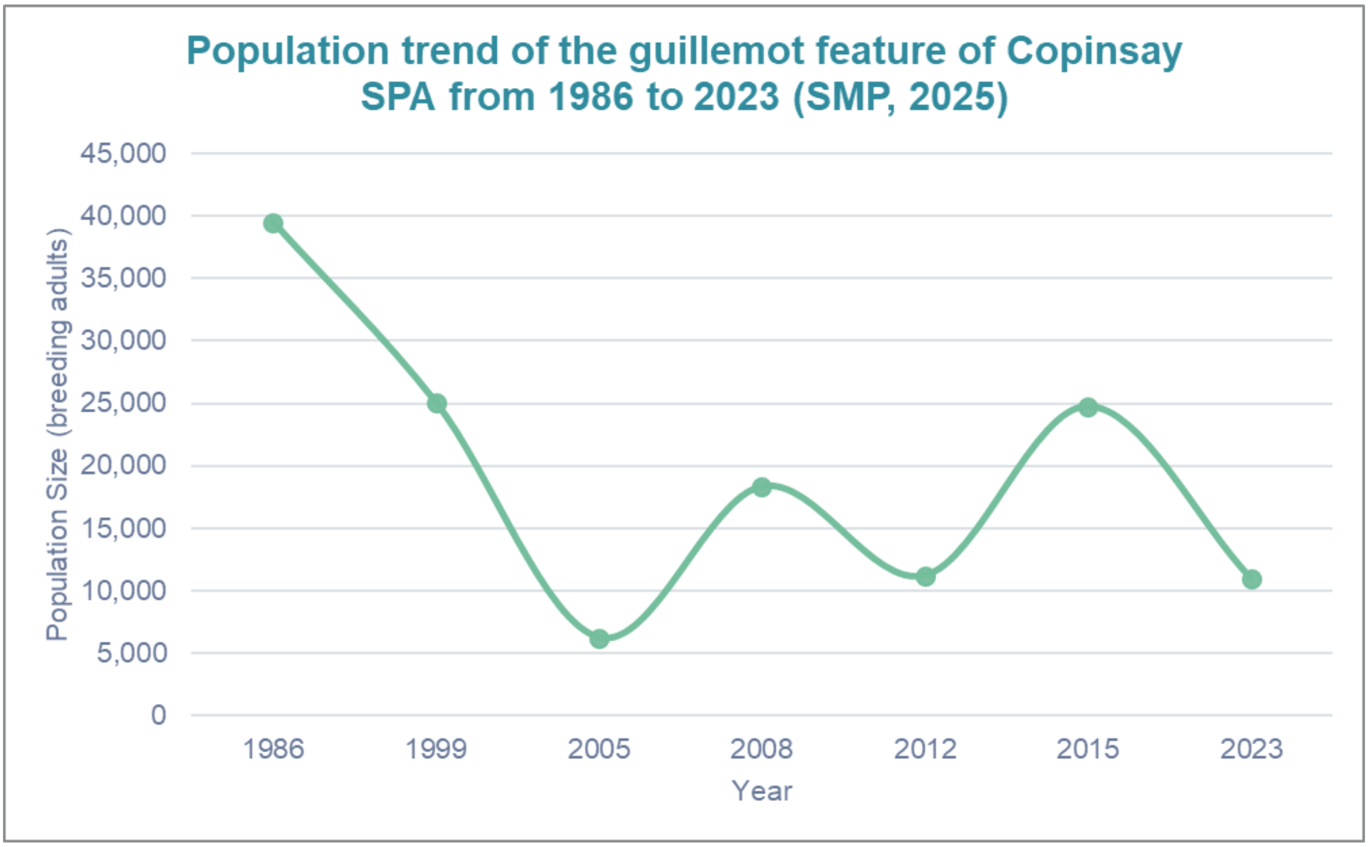

Table 6.76 Census data for the guillemot feature of Copinsay SPA between 1986 to 2024

Year	Census Count						
	1986	1999	2005	2008	2012	2015	2023
Population (breeding adults)	39,460	25,025	6,263	18,331	11,214	24,728	10,991

Table 6.77 Annual compound growth rate for the guillemot feature of Copinsay SPA between 1986 to 2024

Year	1986 to 2023	1986 to 2005	2005 to 2012	2012 to 2015	2015 to 2023
Change in population size (breeding adults)	-28,469	-33,197	4,951	13,514	-13,737
Annual compound growth rate (%)	-3.40%	-9.23%	8.68%	30.16%	-9.64%

Distributional response during the operation and maintenance stage

6.2.12.11 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.78** and **Table 6.79**. These impact predictions are based on abundance and consequent mortality following both the Developer and guidance preferred displacement and mortality rates presented in **Table 6.6**, apportioned to the guillemot feature of Copinsay SPA using the apportioning rates presented in **Table 6.75**. The appropriateness of the proposed displacement and mortality rates for the Developer and guidance approaches are summarised within **Section 6.2.4**.

6.2.12.12 A displacement matrix is also presented within **Table 6.78** for the predicted annual breeding adult apportioned abundance for the guillemot feature of Copinsay SPA within the Project OAA plus 2km buffer.

Table 6.78 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the guillemot feature of Copinsay SPA following the Developer approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			50% Disp; 0 to 1% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	24,761	Breeding season	0.00 to 6.17	0.000% to 0.025%
		Non-breeding season	0.00 to 1.85	0.000% to 0.007%
		Annual	0.00 to 8.01	0.000% to 0.032%
Latest count (2015-2023)	10,991	Breeding season	0.00 to 6.17	0.000% to 0.056%
		Non-breeding season	0.00 to 1.85	0.000% to 0.017%
		Annual	0.00 to 8.01	0.000% to 0.073%

Table 6.79 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the guillemot feature of Copinsay SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted Impact	
			60% Disp; 1 to 5% Mort (breeding adults per annum)*	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	24,761	Breeding season	22.20 to 22.20	0.090% to 0.090%
		Non-breeding season	2.22 to 6.65	0.009% to 0.027%
		Annual	24.41 to 28.85	0.099% to 0.117%
Latest count (2015-2023)	10,991	Breeding season	22.20 to 22.20	0.202% to 0.202%
		Non-breeding season	2.22 to 6.65	0.020% to 0.061%
		Annual	24.41 to 28.85	0.222% to 0.262%

Table Note: *As summarised in **Table 6.6**, a mortality rate of 3 to 5% has been applied during the breeding season and a mortality rate of 1 to 3% has been applied during the non-breeding season

6.2.12.13 As summarised in **Table 6.78** and **Table 6.79**, the level of impacted predicted annually or seasonally exceeds a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) further consideration of the predicted impact is required via PVA.

6.2.12.14 PVA has been undertaken for the 35-year operational lifetime of the Project and modelled using the latest count of 10,991 breeding adults. Outputs are presented in **Table 6.80** below, including the predicted median CGR and median CPS. PVA modelling was undertaken using density independent modelling, and therefore the CGR value is considered a more reliable metric than CPS values for interpreting impacts (see **Section 6.2.6**). For full details on PVA methodology, see **Appendix C**.

6.2.12.15 The known recent and historic growth trends of the guillemot feature of Copinsay SPA are presented within **Table 6.77**. When interpreting the PVA outputs presented within **Table 6.80**, it is important to consider the following points:

- From 1986-2005 the colony underwent considerable decline (**Plate 6.10, Table 6.77**). The reason for such a decline in the population is likely due to a reduction in key prey abundance and adverse weather event leading to a significant auk wreck within the early 2000's (Burnell *et al.,* 2023).
- Since 2005, the population has fluctuated with an overall minor population growth trend. Between 2012 and 2015, the population had an annual increase of 30.16%, while between 2015-2023 there was an annual decline of 9.64% (**Table 6.77**).
- The sandeel (Prohibition of Fishing) (Scotland) Order 2024 should reduce the risk of another significant reduction in key prey abundance for guillemot.
- The guillemot feature of Copinsay SPA is currently classified as being in unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.

- The effect of HPAI on guillemot colonies in Scotland varied considerably, though an overall decline of 56% was recorded between pre and post HPAI counts for Copinsay SPA (Tremlett *et al*., 2024). However, it is unclear to what degree this is due to HPAI, or if the change is related to other factors (such as population redistribution, adverse weather, change in prey availability or survey error) (Tremlett *et al*., 2024).
- The potential effect predicted for the guidance approach is highly likely to be an overestimate. There is strong evidence to support the use of the Developer approach to auk displacement rate of 50% and a 1% mortality rate at most, whereas the use of a mortality rate of up to 5% per annum is not supported by current available evidence (**Section 6.2.4**).

6.2.12.16 The predicted in-combination impact is most realistically considered against the Developer approach, which results in a 0.08% reduction in annual population growth rate. This impact is sufficiently small that it would be indistinguishable from natural fluctuations in the population and can confidently be concluded as not resulting in an AEoSI and therefore is not considered to impact the recovery conservation objective.

6.2.12.17 Even when considering the upper guidance approach, a reduction of 0.30% per annum is likely to be indistinguishable from natural fluctuations in the population given the degree of fluctuations reported in **Table 6.77**.

6.2.12.18 Therefore, **the potential for an AEoSI in relation to distributional response impacts during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.80 PVA results for annual predicted impacts from the Project alone apportioned to the guillemot feature of Copinsay SPA

Scenario modelled	Annual increase in mortality (breeding adults)	Density independent counterfactual metric (35yrs)			
		Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35yrs (%)
50% Displacement, 1% mortality	8.0	0.999	0.08	0.971	2.94
60% displacement, 3% mortality (breeding, 1% mortality (non-breeding)	24.4	0.998	0.25	0.914	8.62
60% displacement, 5% mortality (breeding, 3% mortality (non-breeding)	28.8	0.997	0.30	0.899	10.10

Table 6.81 Copinsay SPA guillemot feature operation and maintenance stage displacement matrix

Displacement (%)	Mortality (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	1	1	2	3	5	6	8	10	11	13	14	16
10	0	2	3	5	6	8	16	32	48	64	80	96	112	128	144	160
20	0	3	6	10	13	16	32	64	96	128	160	192	224	256	288	321
30	0	5	10	14	19	24	48	96	144	192	240	288	337	385	433	481
40	0	6	13	19	26	32	64	128	192	256	321	385	449	513	577	641
50	0	8	16	24	32	40	80	160	240	321	401	481	561	641	721	801
60	0	10	19	29	38	48	96	192	288	385	481	577	673	769	865	962
70	0	11	22	34	45	56	112	224	337	449	561	673	785	898	1,010	1,122

Displacement (%)	**Mortality (%)**															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
80	0	13	26	38	51	64	128	256	385	513	641	769	898	1,026	1,154	1,282
90	0	14	29	43	58	72	144	288	433	577	721	865	1,010	1,154	1,298	1,442
100	0	16	32	48	64	80	160	321	481	641	801	962	1,122	1,282	1,442	1,603

Entanglement during the operation and maintenance stage

6.2.12.19 As summarised in **Section 6.2.16**, **the potential for an AEoSI in relation to entanglement during the O&M stage for the guillemot feature of Copinsay SPA can confidently be ruled out.**

Fulmar

Distributional response during the operation and maintenance stage

6.2.12.20 The assessment of distributional response effects for the fulmar feature of Copinsay SPA is presented within **Section 6.2.17**. As concluded within **Section 6.2.17**, **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

6.2.13 Fair Isle SPA

Site description

6.2.13.1 As identified at screening stage the Fair Isle SPA is located approximately 163km from the OAA. Given the distance from the SPA, the Project does not directly overlap with the SPA boundary or any known functionally linked areas.

6.2.13.2 SPA site description is as follows (NatureScot, 2024): *"Fair Isle is an Old Red Sandstone Island, the most southerly of the Shetland group, lying halfway between Mainland and Orkney. It has a rocky, cliff coastline with adjacent coastal waters, heather moorland, acidic grassland, maritime grassland and crofting in-bye. The boundary of Fair Isle SPA is coincident with Fair Isle SSSI. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface."*

Conservation objectives and condition assessment

6.2.13.3 The overarching conservation objectives for the SPA are listed below. Those relevant to assessment are highlighted bold, based on consideration of how the identified impact pathways may affect the qualifying features screened in for assessment:

- To ensure that the qualifying features of the Fair Isle SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the Fair Isle SPA is restored in the context of environmental changes by meeting the following objectives for each feature:**
  - **the populations of the qualifying features are viable components of the Fair Isle SPA;**
  - the distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at Fair Isle SPA.

6.2.13.4 The condition status of qualifying features screened in for assessment (**Table 3.1**) are as follows:

- The latest condition assessment for the great skua feature of Fair Isle SPA was completed by NatureScot in 2024. The great skua feature was classified to be in a favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.

- The latest condition assessment for the kittiwake feature of Fair Isle SPA was completed by NatureScot in 2024. The kittiwake feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the guillemot feature of Fair Isle SPA was completed by NatureScot in 2024. The guillemot feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the razorbill feature of Fair Isle SPA was completed by NatureScot in 2024. The razorbill feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the puffin feature of Fair Isle SPA was completed by NatureScot in 2016. The puffin feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the fulmar feature of Fair Isle SPA was completed by NatureScot in 2024. The fulmar feature was classified to be in a favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.
- The latest condition assessment for the gannet feature of Fair Isle SPA was completed by NatureScot in 2024. The gannet feature was classified to be in a favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.

Qualifying features requiring assessment

6.2.13.5 The qualifying features of Copinsay SPA where the potential for a LSE was concluded for identified effect pathways, seasons and Project stages are as follows:

- Great skua:
  - collision risk within the OAA during the O&M stage (breeding season).
- Kittiwake:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - collision risk within the OAA during the O&M stage (breeding and non-breeding season).
- Guillemot:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - entanglement within the OAA during the O&M stage (breeding and non-breeding season).
- Razorbill:

  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - entanglement within the OAA during the O&M stage (breeding and non-breeding season).
- Puffin:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - entanglement within the OAA during the O&M stage (breeding and non-breeding season).
- Fulmar:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season).
- Gannet:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season);
  - collision risk within the OAA during the O&M stage (breeding and non-breeding season); and
  - entanglement within the OAA during the O&M stage (breeding and non-breeding season).

6.2.13.6 For the above features **Table 6.82** provides information on the contemporaneous and latest count for relevant qualifying features which have been utilised for assessment of potential effects, where relevant.

Table 6.82 Fair Isle SPA contemporaneous and latest count for relevant qualifying features

Qualifying feature	Contemporaneous count (Burnell *et al.* 2023; breeding adults)	Latest count (SMP,2025; breeding adults)*
Great skua	860	326 (2024)
Kittiwake	896	-
Guillemot	24,515	-
Razorbill	2,580	-
Puffin	13,332	-
Gannet	9,942	11,184 (2024)

Table Note: *Year of latest count provided in brackets.

6.2.13.7 Seasonal apportioning rates for each qualifying feature screened in for assessment are provided in **Table 6.83**. Further detail of how these apportioning rates have been derived is provided in **Appendix C**.

Table 6.83 Fair Isle SPA apportionment results to inform assessment

Qualifying feature	Breeding season apportioning rate				Non-breeding season apportionment rate (%)		
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	Return migration rate (%; collision risk only)	Post-breeding migration rate (%; collision risk only)	Non-breeding rate (%; distributional responses only)
Great skua	8.04%	0%	67.87%	5.46%	N/A	N/A	N/A
Kittiwake	0.25%	10%	69.14%	0.16%	0.15%	0.11%	0.15%
Guillemot	8.48%	7%	60.65%	4.78%	N/A	N/A	4.78%
Razorbill	4.85%	7%	58.58%	2.64%	N/A	N/A	0.25%
Puffin	7.57%	7%	94.07%	6.62%	N/A	N/A	1.38%
Gannet	5.17%	10%	68.36%	3.18%	2.21%	1.38%	1.38%

Assessment of potential effects from the project alone

Great skua

Collision risk during the operation and maintenance stage

6.2.13.8 The assessment of collision risk for the great skua feature of Fair Isle SPA is presented within **Section 6.2.21**. As concluded within **Section 6.2.21**, **the potential for an AEoSI in relation to collision risk during the O&M stage can confidently be ruled out for the Project alone**.

Kittiwake

Distributional responses, collision risk and combined effects during the operation and maintenance stage

6.2.13.9 The assessment of the kittiwake feature of Fair Isle SPA is presented within **Section 6.2.21**. For all effect pathways assessed, **the potential for an AEoSI can confidently be ruled out for the Project alone**.

Guillemot

Population trend

6.2.13.10 The population growth trends of the Fair Isle SPA guillemot feature are based on census data within the SMP database (2025) (**Plate 6.11, Table 6.84,Table 6.85**). Between 1986 to 1999, the colony population trend was relatively stable to increasing. During the early 2000s the colony underwent significant decline before stabilising in 2010. Between 2003 to 2007 Scottish guillemot colonies recorded a drop in productivity which is believed to correlate with a reduction in sandeel abundance at the time (Burnell *et al.* 2023), which likely explains the population decline observed at Fair Isle SPA. In recent years the colony trend has stabilised but with a slight decline noted in the most recent count in 2021. The effect of HPAI on guillemot colonies in Scotland varied considerably, which is also reflected at colonies across Shetland, such as Noss and Hermaness, Saxa Vord and Valla Field (-17% and +10% population change post HPAI respectively), however guillemots on Fair Isle SPA were not monitored in Tremlett *et al.* (2024). Therefore, the extent of impact on the guillemot colony at Fair Isle SPA as a result of HPAI is unclear.

Plate 6.11 Population trend of the guillemot feature of Fair Isle SPA from 1986 to 2021 (SMP, 2025)

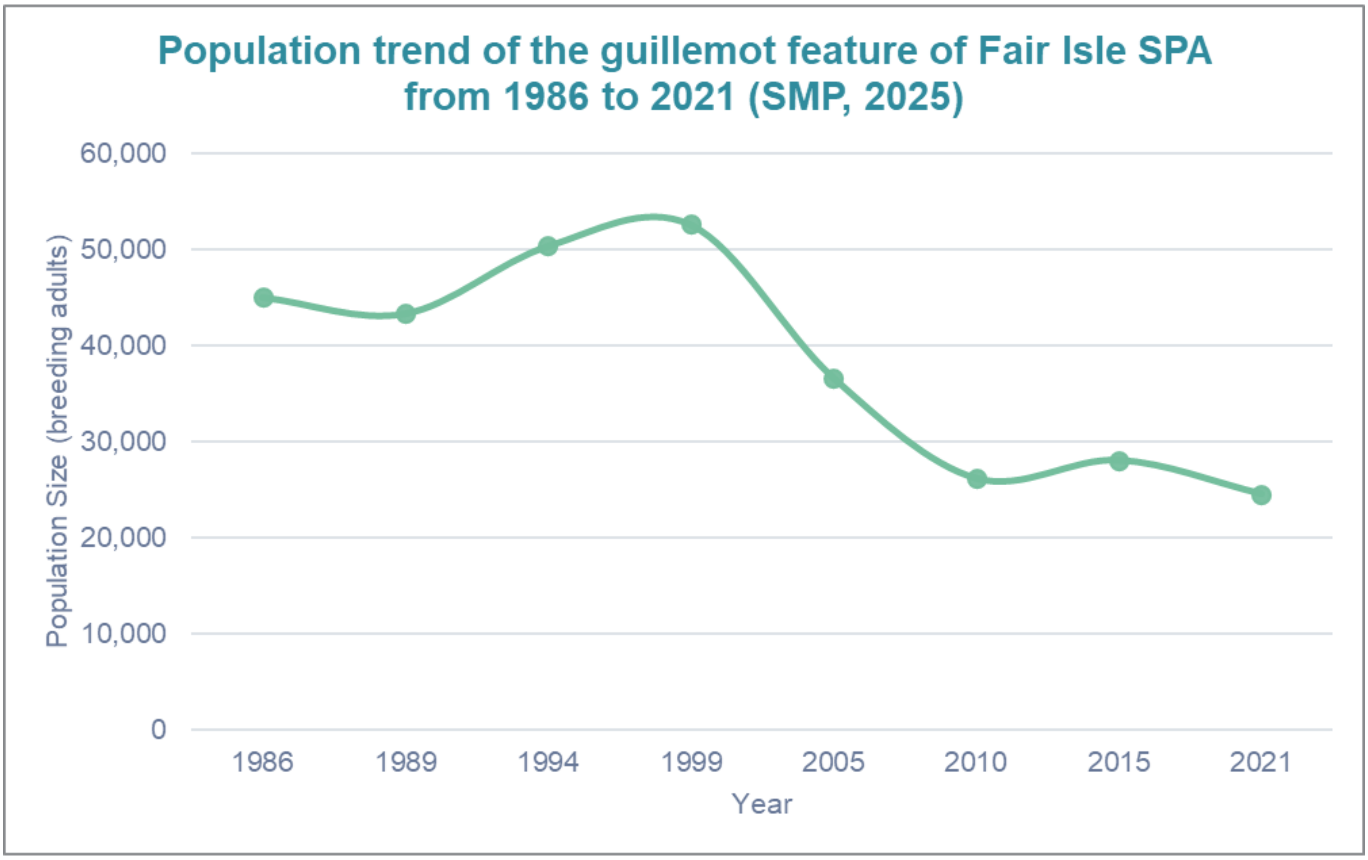

Table 6.84 Census data for the guillemot feature of Fair Isle SPA between 1986 to 2021

Year	Census Count							
	1986	**1989**	**1994**	**1999**	**2005**	**2010**	**2015**	**2021**
Population (breeding adults)	45,019	43,310	50,348	52,604	36,622	26,131	28,038	24,515

Table 6.85 Annual compound growth rate for the guillemot feature of Fair Isle SPA between 1986 to 2021

Year	1986 to 2021	1986 to 1995	1999 to 2010	2010 to 2015	2015 to 2021
Change in population size (breeding adults)	-20,503	7,586	-26,473	1,907	-3,523
Annual compound growth rate (%)	-1.72%	1.21%	-6.16%	1.42%	-2.21%

Distributional response during the operation and maintenance stage

6.2.13.11 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.86** and **Table 6.87** These impact predictions are based on abundance and consequent mortality following both the Developer and guidance preferred displacement and mortality rates presented in **Table 6.6**, apportioned to the guillemot feature of Fair Isle SPA using the apportioning rates presented in **Table 6.83.** The appropriateness of the proposed displacement and mortality rates for the Developer and guidance approaches are summarised within **Section 6.2.4**.

6.2.13.12 A displacement matrix is also presented within **Table 6.86** for the predicted annual breeding adult apportioned abundance for the guillemot feature of Fair Isle SPA within the Project OAA plus 2km buffer.

Table 6.86 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the guillemot feature of Fair Isle SPA following the Developer approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			50% Disp; 0 to 1% Mort (breeding adults per annum)	**Percentage point change in survival rate (%)**
Burnell *et al.* (2023)	24,515	Breeding season	0.00 to 4.31	0.000% to 0.018%
		Non-breeding season	0.00 to 1.29	0.000% to 0.005%
		Annual	0.00 to 5.60	0.000% to 0.023%

Table 6.87 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the guillemot feature of Fair Isle SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			60% Disp; 1 to 5% Mort (breeding adults per annum)*	**Percentage point change in survival rate (%)**
Burnell *et al.* (2023)	24,515	Breeding season	15.51 to 25.85	0.063% to 0.105%
		Non-breeding season	1.55 to 4.65	0.006% to 0.019%
		Annual	17.06 to 30.50	0.070% to 0.124%

Table Note: *As summarised in **Table 6.6**, a mortality rate of 3 to 5% has been applied during the breeding season and a mortality rate of 1 to 3% has been applied during the non-breeding season

6.2.13.13 As summarised in **Table 6.86** and **Table 6.87**, the level of impacted predicted annually or seasonally exceeds a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) further consideration of the predicted impact is required via PVA.

6.2.13.14 8PVA has been undertaken for the 35-year operational lifetime of the Project and modelled using the latest count of 24,515 breeding adults. Outputs are presented in **Table 6.88** below, including the predicted median CGR and median CPS. PVA modelling was undertaken using density independent modelling, and therefore the CGR value is considered a more reliable metric than CPS values for interpreting impacts (see **Section 6.2.6**). For full details on PVA methodology, see **Appendix C**.

6.2.13.15 The known recent and historic growth trends of the guillemot feature of Fair Isle SPA are presented within **Table 6.85**. When interpreting the PVA outputs presented within **Table 6.88,** it is important to consider the following points:

- Between 1986-1999, the colony population trend was relatively stable to increasing, with the population increasing from 45,019 to 52,604 breeding adults. During the early 2000s the colony underwent significant decline before stabilising in 2010 breeding adults (**Plate 6.11, Table 6.85**). Between 2003-2007 Scottish guillemot colonies recorded a drop in productivity that is believed to correlate with a reduction in sandeel abundance at the time (Burnell *et a*l., 2023), which likely explains the population decline observed at Fair Isle SPA.
- In recent years the colony trend has stabilised, though a slight decline is noted in the most recent count in 2021 (**Plate 6.11, Table 6.85**).
- The effect of HPAI on guillemot colonies in Scotland varied considerably, which is also reflected at colonies across Shetland, such as Noss and Hermaness, Saxa Vord and Valla Field (-17% and +10% population change post HPAI respectively), however guillemots on Fair Isle SPA were not monitored in Tremlett *et al.* (2024). Therefore, the extent of impact on the guillemot colony at Fair Isle SPA as a result of HPAI is unclear.
- The sandeel (Prohibition of Fishing) (Scotland) Order 2024 should reduce the risk of another significant reduction in key prey abundance for guillemot.
- The guillemot feature of Fair Isle SPA is currently classified as being in unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The potential effect predicted for the guidance approach is highly likely to be an overestimate. There is strong evidence to support the use of the Developer approach to auk displacement rate of 50% and a 1% mortality rate at most, whereas the use of a mortality rate of up to 5% per annum is not supported by current available evidence (**Section 6.2.4**).

6.2.13.16 Regardless of approach, the predicted reduction in growth rates presented within **Table 6.88** are sufficiently small that they would be indistinguishable from natural fluctuations. Such minimal reductions in annual growth rate would not impede the recovery of the feature. Therefore, the **potential for an AEoSI in relation to distributional response impacts during the O&M stage can confidently be ruled out for the Project alone.**

Table 6.88 PVA results for annual predicted impacts for the Project alone apportioned to the guillemot feature of Fair Isle SPA

Scenario modelled	Annual increase in mortality (breeding adults)	Density independent counterfactual metric (35yrs)			
		Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35yrs (%)
50% Displacement, 1% mortality	5.6	1.000	0.03	0.991	0.93
60% displacement, 3% mortality (breeding, 1% mortality (non-breeding)	17.1	0.999	0.08	0.972	2.77
60% displacement, 5% mortality (breeding, 3% mortality (non-breeding)	30.5	0.999	0.14	0.951	4.92

Table 6.89 Fair Isle SPA guillemot feature operation and maintenance stage displacement matrix

Displacement (%)	Mortality (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	1	1	2	3	4	6	7	8	9	10	11
10	0	1	2	3	4	6	11	22	34	45	56	67	78	90	101	112
20	0	2	4	7	9	11	22	45	67	90	112	134	157	179	202	224
30	0	3	7	10	13	17	34	67	101	134	168	202	235	269	302	336
40	0	4	9	13	18	22	45	90	134	179	224	269	314	358	403	448
50	0	6	11	17	22	28	56	112	168	224	280	336	392	448	504	560
60	0	7	13	20	27	34	67	134	202	269	336	403	470	538	605	672
70	0	8	16	24	31	39	78	157	235	314	392	470	549	627	706	784

Displacement (%)	**Mortality (%)**															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
80	0	9	18	27	36	45	90	179	269	358	448	538	627	717	806	896
90	0	10	20	30	40	50	101	202	302	403	504	605	706	806	907	1,008
100	0	11	22	34	45	56	112	224	336	448	560	672	784	896	1,008	1,120

Entanglement during the operation and maintenance stage

6.2.13.17 As summarised in **Section 6.2.16**, **the potential for an AEoSI in relation to entanglement during the O&M stage for the guillemot feature of Fair Isle SPA can confidently be ruled out.**

Puffin

Distributional response during the operation and maintenance stage

6.2.13.18 The assessment of distributional response effects for the puffin feature of Fair Isle SPA is presented within **Section 6.2.22**. As concluded within **Section 6.2.22**, **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Entanglement during the operation and maintenance stage

6.2.13.19 As summarised in **Section 6.2.16**, **the potential for an AEoSI in relation to entanglement during the O&M stage for the puffin feature of Fair Isle SPA can confidently be ruled out.**

Razorbill

Distributional response during the operation and maintenance stage

6.2.13.20 The assessment of distributional response effects for the razorbill feature of Fair Isle SPA is presented within **Section 6.2.22** As concluded within **Section 6.2.22**, **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Entanglement during the operation and maintenance stage

6.2.13.21 As summarised in **Section 6.2.16**, **the potential for an AEoSI in relation to entanglement during the O&M stage for the razorbill feature of Fair Isle SPA can confidently be ruled out.**

Fulmar

Distributional response during the operation and maintenance stage

6.2.13.22 The assessment of distributional response effects for the fulmar feature of Fair Isle SPA is presented within **Section 6.2.17**. As concluded within **Section 6.2.17**, **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Gannet

Distributional responses, collision risk and combined effects during the operation and maintenance stage

6.2.13.23 The assessment of the gannet feature of Fair Isle SPA is presented within **Section 6.2.24**. For all effect pathways assessed, **the potential for an AEoSI can confidently be ruled out for the Project alone**.

Entanglement during the operation and maintenance stage

6.2.13.24 As summarised in **Section 6.2.16**, **the potential for an AEoSI in relation to entanglement during the O&M stage for the gannet feature of Fair Isle SPA can confidently be ruled out.**

6.2.14 Calf of Eday SPA

Site description

6.2.14.1 As identified at screening stage the Calf of Eday SPA is located approximately 174km from the OAA. Given the distance from the SPA, the Project does not directly overlap with the SPA boundary or any known functionally linked areas.

6.2.14.2 SPA site description is as follows (NatureScot, 2024): *Calf of Eday Special Protection Area (SPA) is a small maritime island to the north of Eday in Orkney. Calf of Eday has a rocky shoreline with cliffs to the north and the west. The island is covered by maritime heath and grassland. The boundary of the Special Protection Area encompasses the boundary of the Calf of Eday SSSI, and the seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface."*

Conservation objectives and condition assessment

6.2.14.3 The overarching conservation objectives for the SPA are listed below. Those relevant to assessment are highlighted bold, based on consideration of how the identified impact pathways may affect the qualifying features screened in for assessment:

- To ensure that the qualifying features of the Calf of Eday SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the Calf of Eday SPA is restored in the context of environmental changes by meeting the following objectives for each feature:**
  - **the populations of the qualifying features are viable components of the Calf of Eday SPA;**
  - the distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at Calf of Eday SPA.

6.2.14.4 The condition status of qualifying features screened in for assessment (**Table 3.1**) are as follows:

- The latest condition assessment for the great black-backed gull feature of Calf of Eday SPA was completed by NatureScot in 2024. The great black-backed gull feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.

- The latest condition assessment for the kittiwake feature of Calf of Eday SPA was completed by NatureScot in 2024. The kittiwake feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the guillemot feature of Calf of Eday SPA was completed by NatureScot in 2024. The guillemot feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the fulmar feature of Calf of Eday SPA was completed by NatureScot in 2024. The fulmar feature was classified to be in a favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.

Qualifying features requiring assessment

6.2.14.5 The qualifying features of Calf of Eday SPA where the potential for a LSE was concluded for identified effect pathways, seasons and Project stages are as follows:

- Great black-backed gull:
  - collision risk within the OAA during the O&M stage (non-breeding season)
- Kittiwake:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - collision risk within the OAA during the O&M stage (breeding and non-breeding season).
- Guillemot:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - entanglement within the OAA during the O&M stage (breeding and non-breeding season).
- Fulmar:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season).

6.2.14.6 For the above features **Table 6.90** provides information on the contemporaneous and latest count for relevant qualifying features which have been utilised for assessment of potential effects, where relevant.

Table 6.90 Calf of Eday SPA contemporaneous and latest count for relevant qualifying features

Qualifying feature	Contemporaneous count (Burnell *et al.* 2023; breeding adults)	Latest count (SMP,2025; breeding adults)*
Great black-backed gull	532	278
Kittiwake	672	-
Guillemot	4,681**	-

Table Note: *Year of latest count provided in brackets. ** It is unclear with the guillemot 2015 to 2021 population estimate for Calf of Eday SPA is derived from as it does not match SMP (2025) colony counts presented in **Table 6.92**.

6.2.14.7 Seasonal apportioning rates for each qualifying feature screened in for assessment are provided in **Table 6.91**. Further detail of how these apportioning rates have been derived is provided in **Appendix C**.

Table 6.91 Calf of Eday SPA apportionment results to inform assessment

Qualifying feature	Breeding season apportioning rate				Non-breeding season apportionment rate (%)			
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	Return migration rate (%; collision risk only)	Post-breeding migration rate (%; collision risk only)	Non-breeding rate (%; collision risk only)	Non-breeding rate (%; distributional responses only)
Great black-backed gull	N/A	N/A	N/A	N/A	N/A	N/A	0.09%	N/A
Kittiwake	0.18%	10%	69.14%	0.11%	0.14%	0.11%	N/A	0.14%
Guillemot	1.51%	7%	60.65%	0.85%	N/A	N/A	N/A	0.85%

Assessment of potential effects from the Project alone

Kittiwake

Distributional responses, collision risk and combined effects during the operation and maintenance stage

6.2.14.8 The assessment of the kittiwake feature of Calf of Eday SPA is presented within **Section 6.2.21**. For all effect pathways assessed, **the potential for an AEoSI can confidently be ruled out for the Project alone**.

Great black-backed gull

Collision risk during the operation and maintenance stage

6.2.14.9 The assessment of collision risk for the great black-backed gull feature of Calf of Eday SPA is presented within **Section 6.2.20**. As concluded within **Section 6.2.20**, **the potential for an AEoSI in relation to collision risk during the O&M stage can confidently be ruled out for the Project alone**.

Guillemot

Population trend

6.2.14.10 The population growth trends of the Calf of Eday SPA guillemot feature are based on census data within the SMP database (2025) **(Plate 6.12, Table 6.92, Table 6.93**). Since citation in 1998, the colony population has experienced a declining trend before stabilising in 2002. Between 2002 and 2018, the colony experienced a steady increase in population size although no population data is available pre and post HPAI to understand the current population trend. The effect of HPAI on guillemot colonies in Scotland varied considerably, which was also reflected at colonies across Orkney, although the Calf of Eday was not monitored in Tremlett *et al.* (2024). Therefore, the extent of impact on the guillemot colony at the Calf of Eday SPA as a result of HPAI is unclear.

Plate 6.12 Population trend for guillemot within the Calf of Eday SPA from 1969 to 2018 (SMP, 2025)

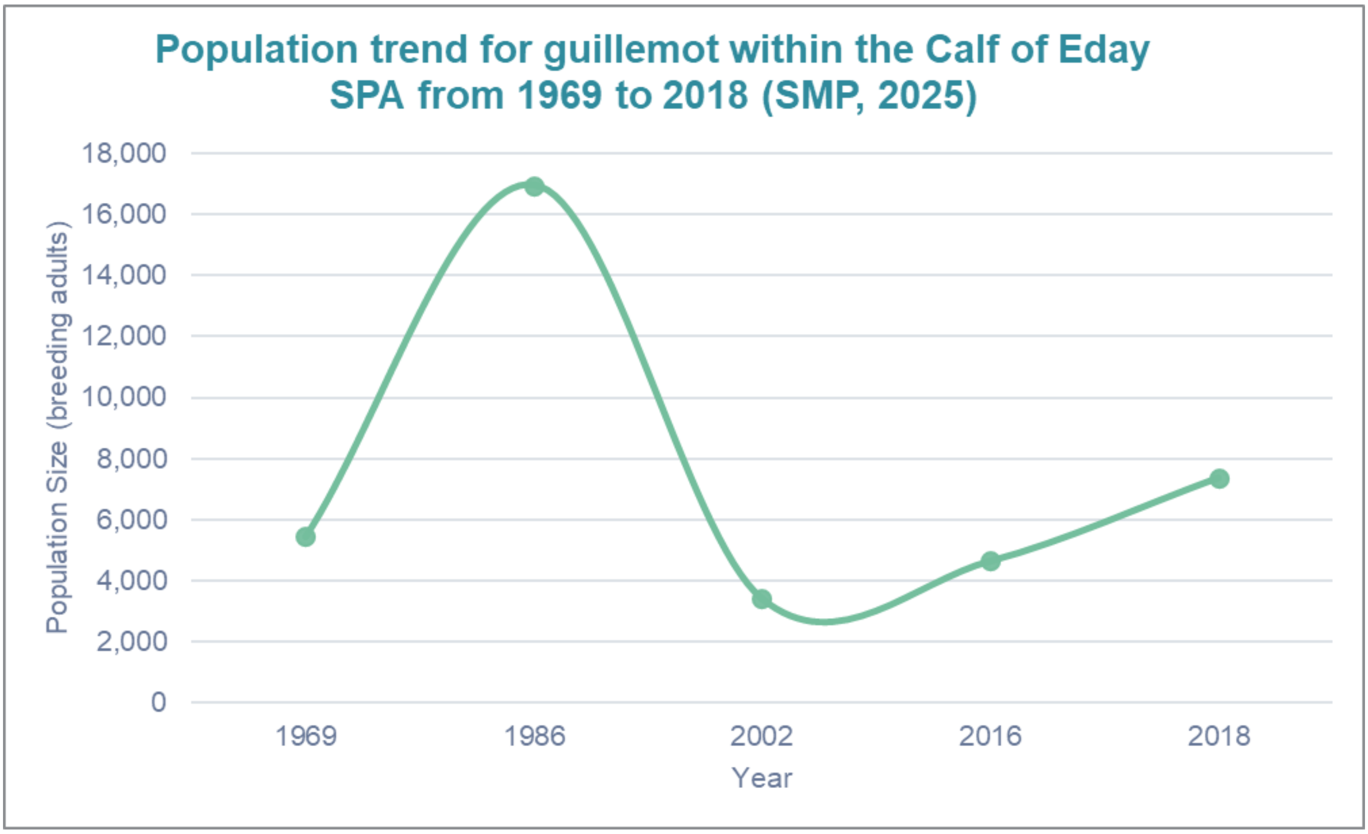

Table 6.92 Census data for the guillemot feature of Calf of Eday SPA between 1969 to 2018

Year	Census Count				
	1969	1986	2002	2016	2018
Population (breeding adults)	5,451	16,944	3,430	4,654	7,375

Table 6.93 Annual compound growth rate for the guillemot feature of Calf of Eday SPA between 1969 to 2018

Year	1969 to 2018	1969 to 1986	1986 to 2002	2002 to 2018	2016 to 2018
Change in population size (breeding adults)	1,925	11,494	-13,514	3,945	2,722
Annual compound growth rate (%)	0.62%	6.90%	-9.50%	4.90%	25.89%

Distributional response during the operation and maintenance stage

6.2.14.11 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.94** and **Table 6.95**. These impact predictions are based on abundance and consequent mortality following both the Developer and guidance preferred displacement and mortality rates presented in **Table 6.6**, apportioned to the guillemot feature of Calf of Eday SPA using the apportioning rates presented in **Table 6.91** The appropriateness of the proposed displacement and mortality rates for the Developer and guidance approaches are summarised within **Section 6.2.4**

6.2.14.12 A displacement matrix is also presented within **Table 6.96** for the predicted annual breeding adult apportioned abundance for the guillemot feature of Calf of Eday SPA within the Project OAA plus 2km buffer.

Table 6.94 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the guillemot feature of Calf of Eday SPA following the Developer approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			50% Disp; 0 to 1% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	4,681	Breeding season	0.00 to 0.77	0.000% to 0.016%
		Non-breeding season	0.00 to 0.23	0.000% to 0.005%
		Annual	0.00 to 1.00	0.000% to 0.021%

Table 6.95 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the guillemot feature of Calf of Eday SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			60% Disp; 1 - 5% Mort (breeding adults per annum)*	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	4,681	Breeding season	2.76 to 4.60	0.059% to 0.098%
		Non-breeding season	0.28 to 0.83	0.006% to 0.018%
		Annual	3.03 to 5.42	0.065% to 0.116%

Table Note: *As summarised in **Table 6.6**, a mortality rate of 3 to 5% has been applied during the breeding season and a mortality rate of 1 to 3% has been applied during the non-breeding season

6.2.14.13 As summarised in **Table 6.94** and **Table 6.95**, the level of impact predicted annually or seasonally exceeds a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) further consideration of the predicted impact is required via PVA.

6.2.14.14 PVA has been undertaken for the 35-year operational lifetime of the Project and modelled using the latest count of 4,681 breeding adults. Outputs are presented in **Table 6.96** below, including the predicted median CGR and median CPS. PVA modelling was undertaken using density independent modelling, and therefore the CGR value is considered a more reliable metric than CPS values for interpreting impacts (see **Section 6.2.6**). For full details on PVA methodology, see **Appendix C**.

6.2.14.15 The known recent and historic growth trends of the guillemot feature of Calf of Eday SPA are presented within **Table 6.93**. When interpreting the PVA outputs presented within **Table 6.96** it is important to consider the following points:

- Between 1998 and 2002 the colony population has experienced a declining trend before stabilising in 2002 (**Plate 6.12,** Annual compound growth rate for the guillemot feature of Calf of Eday SPA between 1969 to 2018).
- Though no data more recent than 2018 exists for the Calf of Eday SPA for guillemot, recent trends show a significant positive population growth rate, with an annual increase of 4.90% per annum between 2002 and 2018. This growth has accelerated in recent years, with the annual increase being 25.89% between 2016 and 2018 (**Table 6.93**).
- As identified within Burnell *et al.* (2023) a key driver of historic population decline in the Scottish guillemot population related to availability of key prey abundance. The sandeel (Prohibition of Fishing) (Scotland) Order 2024 should reduce the risk of reduction in key prey abundance for guillemot.
- The guillemot feature of Calf of Eday SPA is currently classified as being in unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The potential effect predicted for the guidance approach is highly likely to be an overestimate. There is strong evidence to support the use of the Developer approach to auk displacement rate of 50% and a 1% mortality rate at most, whereas the use of a mortality rate of up to 5% per annum is not supported by current available evidence (**Section 6.2.4**).

6.2.14.16 Regardless of approach, the predicted reduction in growth rates presented within **Table 6.96** are sufficiently small that they would be indistinguishable from natural fluctuations. Such minimal reductions in annual growth rate would not impede the recovery of the feature. Therefore, **the potential for an AEoSI in relation to distributional response impacts during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.96 PVA results for annual predicted impacts for the Project alone apportioned to the guillemot feature of Calf of Eday SPA

Scenario modelled	Annual increase in mortality (breeding adults)	Density independent counterfactual metric (35yrs)			
		Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35yrs (%)
50% Displacement, 1% mortality	1.0	1.000	0.02	0.991	0.90
60% displacement, 3% mortality (breeding, 1% mortality (non-breeding)	3.0	0.999	0.07	0.974	2.64
60% displacement, 5% mortality (breeding, 3% mortality (non-breeding)	5.4	0.999	0.13	0.954	4.61

Table 6.97 Calf of Eday SPA guillemot feature operation and maintenance stage displacement matrix

Displacement (%)	Mortality (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	1	1	1	1	1	2	2	2
10	0	0	0	1	1	1	2	4	6	8	10	12	14	16	18	20
20	0	0	1	1	2	2	4	8	12	16	20	24	28	32	36	40
30	0	1	1	2	2	3	6	12	18	24	30	36	42	48	54	60
40	0	1	2	2	3	4	8	16	24	32	40	48	56	64	72	80
50	0	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
60	0	1	2	4	5	6	12	24	36	48	60	72	84	96	108	120
70	0	1	3	4	6	7	14	28	42	56	70	84	98	112	125	139

Displacement (%)	**Mortality (%)**															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
80	0	2	3	5	6	8	16	32	48	64	80	96	112	127	143	159
90	0	2	4	5	7	9	18	36	54	72	90	108	125	143	161	179
100	0	2	4	6	8	10	20	40	60	80	100	120	139	159	179	199

Entanglement during the operation and maintenance stage

6.2.14.17 As summarised in **Section 6.2.16**, **the potential for an AEoSI in relation to entanglement during the O&M stage for the guillemot feature of Calf of Eday SPA can confidently be ruled out.**

Fulmar

Distributional response during the operation and maintenance stage

6.2.14.18 The assessment of distributional response effects for the fulmar feature of Calf of Eday SPA is presented within **Section 6.2.17**. As concluded within **Section 6.2.17**, **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

6.2.15 West Westray SPA

6.2.15.1 As identified at screening stage the West Westray SPA is located approximately 193km from the OAA. Given the distance from the SPA, the Project does not directly overlap with the SPA boundary or any known functionally linked areas.

6.2.15.2 SPA site description is as follows (NatureScot, 2024): *"West Westray SPA is an 8 km stretch of sea cliffs, together with adjacent grassland and heathland, along the west coast of the island of Westray in Orkney. The cliffs support large colonies of breeding auks and kittiwakes while the grassland and heathland areas support breeding colonies of skuas and terns. The boundary of the SPA overlaps with that of the West Westray SSSI, and the seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface."*

Conservation objectives and condition assessment

6.2.15.3 The overarching conservation objectives for the SPA are listed below. Those relevant to assessment are highlighted bold, based on consideration of how the identified impact pathways may affect the qualifying features screened in for assessment:

- To ensure that the qualifying features of the West Westray SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the West Westray SPA is restored in the context of environmental changes by meeting the following objectives for each feature:**
  - **the populations of the qualifying features are viable components of the West Westray SPA;**
  - the distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at West Westray SPA.

6.2.15.4 The condition status of qualifying features screened in for assessment (**Table 3.1**) are as follows:

- The latest condition assessment for the kittiwake feature of West Westray SPA was completed by NatureScot in 2024. The kittiwake feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.

- The latest condition assessment for the razorbill feature of West Westray SPA was completed by NatureScot in 2024. The razorbill feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The latest condition assessment for the fulmar feature of West Westray SPA was completed by NatureScot in 2024. The fulmar feature was classified to be in a favourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population is maintained.

Qualifying features requiring assessment

6.2.15.5 The qualifying features of Copinsay SPA where the potential for a LSE was concluded for identified effect pathways, seasons and Project stages are as follows:

- Kittiwake:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season); and
  - collision risk within the OAA during the O&M stage (breeding and non-breeding season).
- Razorbill:
  - distributional response within the OAA during the O&M stage (non-breeding season); and
  - entanglement within the OAA during the O&M stage (non-breeding season).
- Fulmar:
  - distributional response within the OAA during the O&M stage (breeding and non-breeding season).

6.2.15.6 For the above features **Table 6.98** provides information on the contemporaneous and latest count for relevant qualifying features which have been utilised for assessment of potential effects, where relevant.

Table 6.98 West Westray SPA contemporaneous and latest count for relevant qualifying features

Qualifying feature	Contemporaneous count (Burnell *et al.* 2023; breeding adults)	Latest count (SMP, 2025; breeding adults)*
Kittiwake	1,932	4,838 (2017-2023)
Razorbill	2,893	2,857 (2017-2023)

Table Note: *Year of latest count provided in brackets.

6.2.15.7 Seasonal apportioning rates for each qualifying feature screened in for assessment are provided in **Table 6.99** Further detail of how these apportioning rates have been derived is provided in **Appendix C**.

Table 6.99 West Westray SPA apportionment results to inform assessment

Qualifying feature	Breeding season apportioning rate				Non-breeding season apportionment rate (%)		
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	Return migration rate (%; collision risk only)	Post-breeding migration rate (%; collision risk only)	Non-breeding rate (%; distributional responses only)
Kittiwake	1.17%	10%	69.14%	0.73%	2.30%	1.74%	2.30%
Razorbill	N/A	N/A	N/A	N/A	N/A	N/A	0.15%

Assessment of potential effects from the Project alone

Kittiwake

Population trend

6.2.15.8 The population growth trends of West Westray SPA kittiwake feature are based on census data within the SMP database (2025) (**Plate 6.13, Table 6.100, Table 6.101)** for the Noup Cliffs RSPB count sector, as this is the only sector with consistent colony counts to inform population trends. Since citation in 1996, the colony population overall has experienced a significant decline, although with a decreasing rate since 2004. Within the last six years the colony has remained relatively stable, with a minor decrease in population size recorded pre and post HPAI. In Scotland the kittiwake population increased by 21% post-HPAI in contrast to pre-HPAI, despite a minimum of 760 positive cases of the virus recorded for kittiwake (Tremlett *et al.* 2024). Individual kittiwake colony growth rate changes varied considerably from -83% to +191%, suggesting infection may have been more localised in comparison to the infection spread reported for other species (Tremlett *et al.* 2024). The relatively stable population size between 2017-2023 would suggest kittiwakes at West Westray SPA were not significantly affected by HPAI, though further site-specific information on HPAI is limited to support this conclusion.

Plate 6.13 Population trend for kittiwake within the Noup Cliffs RSPB count sector from 1986 to 2023 (SMP, 2025)

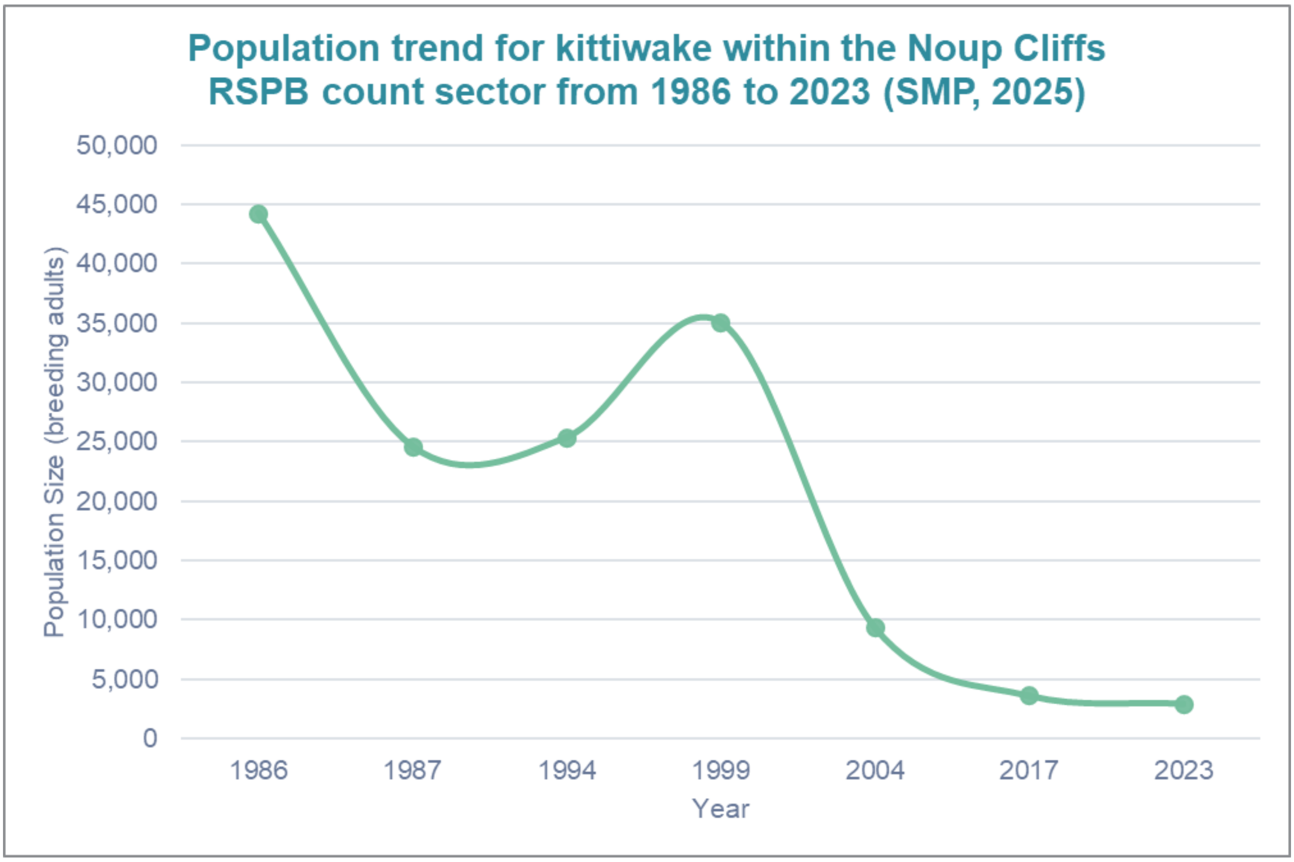

Table 6.100 Census data for kittiwake within the Noup Cliffs RSPB count sector from 1986 to 2023

Year	Census Count						
	1986	1987	1994	1999	2004	2017	2023
Population (breeding adults)	44,300	24,646	25,412	35,092	9,386	3,644	2,972

Table 6.101 Annual compound growth rate for kittiwake within the Noup Cliffs RSPB count sector from 1986 to 2023

Year	1986 to 2023	1986 to 1994	1994 to 1999	1999 to 2004	2004 to 2017	2017 to 2023
Change in population size (breeding adults)	-41,328	-18,888	9,680	-25,706	-5,742	-672
Annual compound growth rate (%)	-7.04%	-6.71%	6.67%	-23.18%	-7.02%	-3.34%

Distributional response during the operation and maintenance stage

6.2.15.9 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.102.** These impact predictions are based on abundance and consequent mortality following the guidance preferred displacement and mortality rates presented in **Table 6.6,** apportioned to the kittiwake feature of West Westray SPA using the apportioning rates presented in **Table 6.99**. The appropriateness of the proposed displacement and mortality rates for the Developer and guidance approaches are summarised within **Section 6.2.4**.

6.2.15.10 A displacement matrix is also presented within **Table 6.103** for the predicted annual breeding adult apportioned abundance for the kittiwake feature of West Westray SPA within the Project OAA plus 2km buffer.

Table 6.102 Summary of predicted distributional response impact during the operation and maintenance stage apportioned to the kittiwake feature of West Westray SPA following the guidance approach

Population count	Population size (breeding adults)	Season	Predicted Impact	
			30% Disp; 1 to 3% Mort (breeding adults per annum)	**Percentage point change in survival rate (%)**
Burnell *et al.* (2023)	1,932	Breeding season	0.02 to 0.06	0.001% to 0.003%
		Non-breeding season	0.01 to 0.03	0.001% to 0.002%
		Annual	0.03 to 0.09	0.002% to 0.005%
Latest count (2017-2023)	4,838*	Breeding season	0.02 to 0.06	0.000% to 0.001%
		Non-breeding season	0.01 to 0.03	0.000% to 0.001%
		Annual	0.03 to 0.09	0.001% to 0.002%

Table Note: High uncertainty in the latest count due to some of the RSPB sub sites not being surveyed since 1999. It is Unclear if due to change in sub-colony sites surveyed or an absence of birds.

6.2.15.11 As summarised in **Table 6.102**, regardless of the approach taken the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.103 West Westray SPA kittiwake feature operation and maintenance stage displacement matrix

Displacement (%)	Mortality (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
20	0	0	0	0	0	0	0	0	1	1	1	1	1	2	2	2
30	0	0	0	0	0	0	0	1	1	1	1	2	2	2	3	3
40	0	0	0	0	0	0	0	1	1	2	2	2	3	3	4	4
50	0	0	0	0	0	0	0	1	1	2	2	3	3	4	4	5
60	0	0	0	0	0	0	1	1	2	2	3	4	4	5	5	6
70	0	0	0	0	0	0	1	1	2	3	3	4	5	5	6	7
80	0	0	0	0	0	0	1	2	2	3	4	5	5	6	7	8
90	0	0	0	0	0	0	1	2	3	4	4	5	6	7	8	9
100	0	0	0	0	0	0	1	2	3	4	5	6	7	8	9	10

Collision risk during the operation and maintenance stage

6.2.15.12 The level of predicted impact in relation to collision risk during the O&M stage is provided in **Table 6.104**. These impact predictions are based on the modelled collision mortality presented within **Table 6.7**, apportioned to the kittiwake feature of West Westray SPA using the apportioning rates presented in **Table 6.99**. There is no deviation between the preferred approach proposed by the Applicant and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised in **Section 6.2.5** and how this may affect the impact predictions presented.

Table 6.104 Summary of predicted collision risk during the operation and maintenance stage apportioned to the kittiwake feature of West Westray SPA following the guidance approach

Population count	Population size	Season	Predicted impact	
			Predicted collisions (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	1,932	Breeding season	0.16	0.009%
		Return migration season	0.24	-
		Post-breeding migration season	0.10	-
		Total non-breeding season	0.34	0.017%
		Annual	0.50	0.026%
Latest count (2017-2023)	4,838*	Breeding season	0.16	0.003%
		Return migration season	0.24	-
		Post-breeding migration season	0.10	-
		Total non-breeding season	0.34	0.007%
		Annual	0.50	0.010%

Table Note: High uncertainty in the latest count due to some of the RSPB sub sites not being surveyed since 1999. It is Unclear if due to change in sub-colony sites surveyed or an absence of birds.

6.2.15.13 As summarised in **Table 6.104**, the level of impact predicted annually or seasonally exceeds a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) further consideration of the predicted impact is required.

6.2.15.14 PVA has been undertaken for the 35-year operational lifetime of the Project and modelled using the latest count of 4,838 breeding adults. Outputs are presented in **Table 6.106** below, including the predicted median CGR and median CPS. PVA modelling was undertaken using density independent modelling, and therefore the CGR value is considered a more reliable metric than CPS values for interpreting impacts (see **Section 6.2.6**). For full details on PVA methodology, see **Appendix C**.

6.2.15.15 The predicted reduction in growth rate presented within **Table 6.106** is sufficiently small that it would be indistinguishable from natural fluctuations. Therefore, **the potential for an AEoSI in relation to collision risk impacts during the O&M stage can confidently be ruled out for the Project alone**.

Combined effects during the operation and maintenance stage

6.2.15.16 Due to the kittiwake feature of West Westray SPA being screened in for assessment of both distributional response and collision risk, there is potential for both effect pathways to impact the feature combined. Consideration of both impacts combined is presented within **Table 6.105** for the guidance approach to assessment of distributional responses.

6.2.15.17 As is standard practice predicted displacement and collision consequent mortality have been added together to inform the level of predicted combined impact. It's important to note that simply adding both impacts together is highly likely to lead to an overestimate of impact, as a bird that is displaced cannot consequently collide with a WTG and vice versa.

Table 6.105 Summary of predicted combined distributional response and collision risk impact during the operation and maintenance stage apportioned to the kittiwake feature of West Westray SPA following the Developer approach

Population count	Population size (breeding adults)	Season	Predicted impact	
			CRM + 30% Disp; 1 - 3% Mort (breeding adults per annum)	Percentage point change in survival rate (%)
Burnell *et al.* (2023)	1,932	Breeding season	0.18 to 0.22	0.010% to 0.012%
		Non-breeding season	0.35 to 0.37	0.018% to 0.019%
		Annual	0.53 to 0.59	0.028% to 0.031%
Latest count (2017-2023)	4,838*	Breeding season	0.18 to 0.22	0.004% to 0.005%
		Non-breeding season	0.35 to 0.37	0.007% to 0.008%
		Annual	0.53 to 0.59	0.011% to 0.012%

Table Note: High uncertainty in the latest count due to some of the RSPB sub sites not being surveyed since 1999. It is Unclear if due to change in sub-colony sites surveyed or an absence of birds.

6.2.15.18 As summarised in **Table 6.105** the level of impacted predicted annually or seasonally exceeds a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) further consideration of the predicted impact is required.

6.2.15.19 PVA has been undertaken for the 35-year operational lifetime of the Project and modelled using the latest count of 4,838 breeding adults. Outputs are presented in **Table 6.106** below, including the predicted median CGR and median CPS. PVA modelling was undertaken using density independent modelling, and therefore the CGR value is considered a more reliable metric than CPS values for interpreting impacts (see **Section 6.2.6**). For full details on PVA methodology, see **Appendix C**.

6.2.15.20 When interpreting the PVA outputs presented within **Table 6.106**, it is important to consider the following points:

- Between the seabird 2000 count and the Seabird Count 2015-2021 the kittiwake feature has declined by 13.2% per annum (Burnell *et al.,* 2023).
- Declines during the 2000s are likely attributed to decreases in availability of primary food resources such as sandeel, specifically through impacts of climate change and sandeel fisheries (Burnell *et al.,* 2023).
- When comparing Seabird Count to the latest count, the colony has undergone growth of 58.2% per annum. To note, there is uncertainty regarding the latest count due to some of the RSPB sub sites not being surveyed since 1999. It is unclear whether this is due to change in sub-colony sites surveyed or an absence of birds.
- Recent population growth may reflect remedial actions such as the sandeel (Prohibition of Fishing) (Scotland) Order 2024 and indirect effects of HPAI reducing predication pressure by impacting species such as great skua (Burnell *et al*., 2023).
- In Scotland the kittiwake population increased by 21% post-HPAI in contrast to pre-HPAI, despite a minimum of 760 positive cases of the virus recorded for kittiwake (Tremlett *et al.,* 2024). Individual kittiwake colony growth rate changes varied considerably from -83% to +191%, suggesting infection may have been more localised in comparison to the infection spread reported for other species (Tremlett *et al.,* 2024). In relation to West Westray SPA, a 18% decrease in population size was recorded post HPAI suggesting the colony was affected by HPAI. Overall, the colony has recorded significant growth when comparing pre and post HPAI counts.
- The kittiwake feature of West Westray SPA is currently classified as being in unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.
- The potential effect predicted is highly likely to be a significant overestimate due to high degree of precaution within assessment of CRM (**Section 6.2.5**), no evidence to support a mortality rate of 3% for distributional response effects (**Section 6.2.4**) and simplistic additive manner of considering combined effects.

6.2.15.21 The predicted reduction in growth rate presented within **Table 6.106** is sufficiently small that it would be indistinguishable from natural fluctuations. Therefore, **the potential for an AEoSI in relation to combined distributional response effects and collision risk impacts during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.106 PVA results for annual predicted impacts for the Project alone apportioned to the kittiwake feature of West Westray SPA

Effect pathway	Scenario modelled	Annual increase in mortality (breeding adults)	Density independent counterfactual metric (35yrs)			
			Median CGR (standard deviation (SD))	Reduction in annual growth rate (%)	Median CPS (SD)	Reduction in final population size after 35yrs (%)
Collision risk	Project alone	0.5	1.000	0.01	0.995	0.53
Combined effects	30% displacement; 1% mortality	0.5	1.000	0.01	0.996	0.44
	30% displacement; 3% mortality	0.6	1.000	0.01	0.995	0.49

Razorbill

Distributional response during the operation and maintenance stage

6.2.15.22 The assessment of distributional response effects for the razorbill feature of West Westray SPA is presented within **Section 6.2.22**. As concluded within **Section 6.2.22**, **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Entanglement during the operation and maintenance stage

6.2.15.23 As summarised in **Section 6.2.16**, **the potential for an AEoSI in relation to entanglement during the O&M stage for the razorbill feature of West Westray SPA can confidently be ruled out.**

Fulmar

Distributional response during the operation and maintenance stage

6.2.15.24 The assessment of distributional response effects for the fulmar feature of West Westray SPA is presented within **Section 6.2.17**. As concluded within **Section 6.2.17**, **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

6.2.16 Entanglement

6.2.16.1 For the following qualifying features of designated sites, the potential for a LSE was concluded in relation to entanglement with mooring lines:

- Buchan Ness to Collieston Coast SPA guillemot feature;
- Troup, Pennan and Lion’s Heads SPA guillemot, razorbill feature;
- Forth Islands SPA razorbill, gannet and puffin feature;
- St Abb's Head to Fast Castle SPA razorbill feature;
- Fowlsheugh SPA razorbill feature;
- East Caithness Cliffs SPA razorbill feature;
- North Caithness Cliffs SPA razorbill and puffin feature;
- Copinsay SPA guillemot feature;
- Fair Isle SPA guillemot, razorbill, puffin and gannet feature;
- Farne Islands SPA puffin feature;
- Calf of Eday SPA guillemot feature;
- West Westray SPA razorbill feature;
- Sule Skerry and Sule Stack SPA puffin and gannet feature;
- Noss SPA puffin and gannet feature;
- Foula SPA puffin feature;

- North Rona and Sula Sgeir SPA gannet feature;
- Hermaness, Saxa Vord and Valla Field SPA puffin and gannet feature; and
- Flamborough and Filey Coast SPA razorbill and gannet feature.

6.2.16.2 There is a potential risk to diving seabirds resulting from entanglement with mooring cables whilst foraging. Entanglement can be classified as 'primary entanglement' whereby seabirds could become directly entangled in the mooring cables and associated infrastructure or 'secondary entanglement' whereby seabirds could become entangled in debris (primarily fishing gear) snagged on mooring lines and associated infrastructure.

6.2.16.3 As concluded within the literature reviews undertaken by Ocean Science Consulting (OSC, 2022) and SEER (2022) primary entanglement is considered unlikely due to the mooring lines being under tension and the dimensions of the chain compared to the size of seabirds.

6.2.16.4 Seabirds are known to become entangled in marine debris, including discarded fishing nets, which may lead to birds dying through being drowned (Ryan, 2018), though no evidence was found relating to such events in relation to fishing nets caught up on mooring lines. In relation to secondary entanglement, the potential for discarded and lost fishing gear to become snagged on the mooring line is considered to be a possibility, though there is high uncertainty around the frequency and scale of such occurrence. The potential risk posed to seabirds will also be highly variable depending on the degree of anthropogenic activity (disturbance) within the region, availability of prey around mooring lines, turbidity of water, and the type of fishing gear snagged, though overall the potential risk for entanglement is likely to be minimal (OSC, 2022).

6.2.16.5 It is important to note that, qualifying features concluded as potentially at risk of entanglement (auks and gannet) are also considered to be disturbed and consequently displaced by offshore wind farms. If the predicted displacement rates and distances assessed within **Table 6.6** are true, the consequent displacement effect would eliminate the potential pathway for the majority of breeding adults.

6.2.16.6 The above information therefore suggests there is limited potential for such an effect pathway to occur. **The potential for an AEoSI in relation to secondary entanglement from the Project alone can be confidently ruled out for all qualifying features considered.**

6.2.17 Assessment of fulmar qualifying feature of Scottish SPAs

6.2.17.1 For the following designated sites, further consideration of potential distributional response effects from the Project on fulmar qualifying features was requested by stakeholders (**Table 3.1**):

- Buchan Ness to Collieston Coast SPA;
- Troup, Pennan and Lion's Heads SPA;
- Fowlsheugh SPA;
- East Caithness Cliffs SPA;
- North Caithness Cliffs SPA;
- Copinsay Spa;
- Hoy Spa;
- Fair Isle Spa;

- Calf of Eday Spa;
- Rousay Spa;
- West Westray Spa;
- Cape Wrath Spa;
- Sumburgh Head Spa;
- Handa Spa;
- Noss Spa;
- Foula Spa;
- The Shiant Isles Spa;
- North Rona and Sula Sgeir Spa;
- Fetlar Spa;
- Hermaness, Saxa Vord and Valla Field Spa;
- Flannan Isles Spa;
- Flamborough and Filey Coast Spa;
- St Kilda Spa; and
- Mingulay and Berneray Spa.

6.2.17.2 Fulmars are generally considered to have low vulnerability to displacement effects from offshore wind farms (Furness *et al.* 2013) and are therefore typically screened out of detailed RIAAs.

6.2.17.3 Although some evidence suggests fulmar may exhibit displacement behaviour, it remains inconclusive. Dierschke *et al.* (2016) classified fulmar as a species that weakly avoids offshore wind farms, though this conclusion was based on limited data. More recently, Lamb *et al.* (2024) conducted a meta-analysis indicating significant displacement effects; however, the study also highlighted that fulmar were infrequently recorded and typically occurred at low densities, making robust detection of displacement challenging. Some displacement was observed at the BARD Offshore Wind Farm (Braasch *et al.* 2015), whereas Vanermen and Stienen (2019) reported no significant displacement at the Thorntonbank Offshore Wind Farm.

6.2.17.4 Bradbury *et al.* (2014) assessed seabird vulnerability to displacement based on disturbance susceptibility and habitat specialisation, scoring species from one (lowest vulnerability) to five (highest). Fulmar scored one in both categories, placing it in the lowest risk group. In line with Joint SNCB guidance (SNCBs, 2022), species are only progressed to quantitative assessment if they score three or higher in either category. Fulmar does not meet this threshold and is not listed as a priority species in NatureScot guidance (NatureScot, 2025a).

6.2.17.5 Ecologically, fulmar are generalist feeders, exploiting a wide range of pelagic and intertidal prey, and scavenging fish offal from vessels (Ojowski *et al.* 2001; Camphuysen and Garthe, 1997; Hamer *et al.* 1997; Bourne, 1997). Despite being tied to breeding colonies during the breeding season, they exhibit extensive foraging ranges. Woodward *et al.* (2019) report a MMFR plus one SD of 542 ± 657.9km. Remarkably, tracked individuals from Eynhallow, Scotland, have been recorded foraging in the Charlie-Gibbs Fracture Zone in the Mid-Atlantic Ridge, approximately 6,200km from the colony (Edwards *et al.* 2013). Consequently, even if fulmar were displaced, the additional foraging distance would be negligible relative to their typical foraging behaviour, and their dietary flexibility would facilitate adaptation to alternative foraging grounds.

6.2.17.6 Based on the available research discussed above, there is not considered any realistic pathway to effect for fulmar, with limited research suggesting any potential for impacts from distributional responses. Even if fulmar were to avoid the OAA, their large foraging range and high habitat flexibility would likely result in minimal fitness consequences. Therefore, **the potential for an AEoSI from the Project alone in relation to distributional response effects on fulmar qualifying features of designated sites can be confidently ruled out**.

6.2.18 Assessment of storm petrels and shearwater qualifying feature of Scottish SPAs

6.2.18.1 For the following qualifying features of designated sites, further consideration of potential effects from the Project was requested by stakeholders, namely in relation to light pollution, distributional responses and collision risk (**Table 3.1**):

- Storm petrel feature of Auskerry SPA;
- Storm petrel and Leach's storm petrel feature of Sule Skerry and Sule Stack SPA;
- Storm petrel feature of Mousa SPA;
- Leach's storm petrel feature of Foula SPA;
- Leach's storm petrel feature of North Rona and Sula Sgeir SPA;
- Leach's storm petrel feature of Flannan Isles SPA; and
- Leach's storm petrel and Manx shearwater feature of St Kilda SPA.

6.2.18.2 The above designated sites and effect pathways have been assessed against the following conservation objectives:

- To ensure that the qualifying features of the SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the SPA is restored in the context of environmental changes by meeting the following objectives for each feature:**
  - **the population of the qualifying features are viable components of the SPA;**
  - the distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at the SPA.

6.2.18.3 The conservation objectives of relevance to the assessments presented are highlighted in bold, based on the proximity of the designated sites, functional linkages and potential impact pathways identified.

6.2.18.4 The predicted frequency and abundance of storm petrel and shearwater species abundance recorded within the OAA plus 4km buffer, as detailed within **Volume 3, Appendix 12.1** of the **EIA Report** is considered a presentative view of the current baseline. It is acknowledged that surveys were only conducted during daylight hours, and NatureScot have raised concerns about the potential for missing nocturnally active species, notably Manx shearwater and European storm petrel. However, , there is not expected to be any notable increase in numbers at night compared to those recorded during DAS, based on the following available evidence.

6.2.18.5 The closest European storm petrel colonies to the OAA are located in the Shetland Isles. Tracking data indicate that individuals from these colonies forage up to 397km from the colony during daylight hours. In contrast, nocturnal distributions are considerably more restricted, with birds remaining closer to the colony. This behaviour reflects a diurnal foraging strategy followed by afternoon commuting flights to ensure arrival at the colony under cover of darkness (Bolton, 2021). Given that the OAA lies over 150km from Shetland, storm petrel presence in the area is expected to occur primarily during daylight hours. Consequently, DAS data are considered representative of storm petrel activity in the OAA, especially given data was collected at a resolution of 1.5cm Ground Sampling Distance (GSD) which is above global best practice. Over 24 months of DAS monitoring, storm petrels were recorded in only two months and in low numbers, indicating limited use of the site. No substantial nocturnal presence is anticipated beyond what has been captured during daylight surveys.

6.2.18.6 Similarly, Manx shearwater were recorded in low numbers (only in two months) during DAS, and surveys are not considered to underestimate presence due to potential nocturnal activity. Though Manx shearwater show some nocturnal activity, available evidence shows peak flight and foraging activity just after sunrise, with a second peak before sunset followed by a rapid decline at the onset of darkness (Dean *et al.* 2013). Manx shearwater foraging occurs almost exclusively during daylight hours, with bird activity in the early evening characterised by birds roosting on the water near to colonies before returning to burrows in darkness (Deakin *et al.* 2022). Given the nearest SPA for Manx shearwater is >300km away on the west coast, it is highly unlikely that Manx shearwater will be present within any proximity to the OAA during nocturnal hours, and therefore no substantial nocturnal presence is anticipated beyond what has been captured during daylight surveys.

6.2.18.7 It is recognised that both petrels and shearwaters are sensitive to light pollution, raising the theoretical possibility that artificial lighting associated with the Project could influence their behaviour. However, Brown *et al.* (2023) and Deakin *et al.* (2022) indicates that disorientation in these species is primarily associated with high-intensity lighting, particularly under foggy conditions, based on studies from oil and gas platforms (Ronconi *et al.* 2015). The lighting used on offshore wind farms, including the Project, is of significantly lower intensity than that examined in such studies. The majority of studies are on fledglings conducting maiden flight or adults returning to burrow affected by coastal structures illuminated by light (Brown *et al.* 2023). Additionally, publishing of bird behaviours towards artificial lighting is biased towards opportunistic findings of areas known for stranding, rather than a controlled search of potentially affected birds (Brown *et al.* 2023).

6.2.18.8 Impact consequences of such attraction are speculative due to uncertainty regarding nocturnal behaviours of seabirds (avoidance rate, attraction and flight heights) on approach to illuminated structures.

6.2.18.9 During daylight hours Manx shearwaters utilize slope-soaring and stay close to the water to gain maximum wind shear (Spivey *et al.* 2014), suggesting risk of collision is minimal. Similarly, storm petrels fly with a combination of flapping and short glides, often moving in zig-zags and sometimes shearing in strong winds remaining close to the sea surface, suggesting risk of collision is minimal (Flood and Thomas, 2007).

6.2.18.10 In relation to distributional response effects there is a lack of empirical evidence to inform the likely distributional response of petrels and shearwaters in response to WF developments. Generally, these species have been considered of low vulnerability to displacement (Furness *et al.* 2013) based on their efficient flight behaviour, low wing loading and short flight initiation distances to vessel presence (Deakin *et al.* 2022).

6.2.18.11 Based on current evidence, there has been a generalisation of behaviours towards light that have been translated by some authors to predict responses of adult birds at-sea to turbine lighting based on evidence from oil and gas platforms or vessels. There is currently no evidence to suggest that petrels or shearwaters are attracted to, or adversely affected by, the lighting levels typically used on offshore wind farms (see **Appendix B**; M-038), nor the possibility of an attraction effect resulting in alteration of behaviour increasing the risk for collision.

6.2.18.12 Furthermore, given the low recorded presence of these species in the OAA plus 4km buffer, and the absence of any mechanism by which lighting would draw individuals in from more distant areas, the DAS data is concluded as appropriate at characterising the baseline abundance and distribution of such species within the study area. Consequently, **the potential for an AEoSI from the Project alone in relation to storm petrel species and Manx shearwater qualifying features of designated sites can be confidently ruled out for all potential effect pathways**.

6.2.19 Assessment of great skua qualifying features

6.2.19.1 The following Section provides consolidated assessments of potential effect pathways on great skua features of SPAs where potential connectivity or level of predicted impact is considered limited.

6.2.19.2 For the following great skua features of designated sites, the potential for a LSE was concluded for identified effect pathways, seasons and Project stages as follows:

- Hoy SPA feature for collision risk (breeding season only);
- Fair Isle SPA feature for collision risk (breeding season only);
- Handa SPA feature for collision risk (breeding season only);
- Noss SPA feature for collision risk (breeding season only);
- Foula SPA feature for collision risk (breeding season only);
- Fetlar SPA feature for collision risk (breeding season only);
- Hermaness, Saxa Vord and Valla Field SPA feature for collision risk (breeding season only); and
- St Kilda SPA feature for collision risk (breeding season only).

Conservation objectives

6.2.19.3 Scottish SPAs have been assessed against the following conservation objectives:

- To ensure that the qualifying features of the SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the SPA is restored in the context of environmental changes by meeting the following objectives for each feature the population of the qualifying features are viable components of the SPA;**
  - the distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at the SPA.

6.2.19.4 The conservation objectives of relevance to the assessments presented are highlighted in bold, based on the proximity of the designated sites, functional linkages and potential impact pathways identified.

Apportionment summary for designated sites considered

6.2.19.5 As detailed within **Section 6.2.3** an apportionment process has been undertaken seasonally to understand the level of predicted impact apportioned to individual designated sites. For the great skua features of designated sites considered within this section, a summary of the apportioning rates used to inform assessments is provided within **Table 6.107**. Further detail of how these apportioning rates have been derived is provided in **Appendix C**. To note, great skuas were only recorded within the Project during the breeding season. Therefore, no apportionment was required for the non-breeding season.

Table 6.107 Great skua apportionment results to inform assessment

Designated site	Breeding season apportioning rate			
	Colony apportionment Rate (%)	Sabbatical rate (%)*	Adult / immature ratio rate (%)	Overall apportionment rate (%)
Hoy SPA	5.43%	0%	67.87%	3.69%
Fair Isle SPA	5.70%	0%	67.87%	3.87%
Handa SPA	4.85%	0%	67.87%	3.29%
Noss SPA	16.23%	0%	67.87%	11.01%
Foula SPA	8.04%	0%	67.87%	5.46%
Fetlar SPA	21.41%	0%	67.87%	14.53%
Hermaness, Saxa Vord and Valla Field SPA	0.36%	0%	67.87%	0.25%
St Kilda SPA	1.42%	0%	67.87%	0.96%

Table Note: *As a precautionary approach no sabbatical rate has been applied due to no value being previously agreed with NatureScot as appropriate.

Collision risk during the operation and maintenance stage

6.2.19.6 The level of predicted impact in relation to collision risk during the O&M stage is provided in **Table 6.108.** These impact predictions are based on the modelled collision mortality presented within **Table 6.7**, apportioned to the great skua feature of designated sites considered using the apportioning rates presented in **Table 6.107**. There is no deviation between the preferred approach proposed by the Applicant and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised in **Section 6.2.5** and how this may affect the impact predictions presented.

Table 6.108 Summary of predicted collision risk during the operation and maintenance stage apportioned to the great skua feature of distant designated sites following the guidance approach

Site	Population count	Population size (breeding adults)	Breeding season predicted collision impacts (breeding adults)	Breeding season percentage point change in survival rate (%)
Hermaness, Saxa Vord and Valla Field SPA	Burnell *et al.* (2023).	2,060	0.03	0.001%
	Latest count (2023 to 2024).	472		0.005%
Fetlar SPA	Burnell *et al.* (2023).	1,708	0.03	0.002%
	Latest count (2023)*.	266		0.010%
Noss SPA	Burnell *et al.* (2023).	952	0.02	0.002%
	Latest count (2024).	160		0.014%
Foula SPA	Burnell *et al.* (2023).	3,692	0.07	0.002%
	Latest count (2023)*.	616		0.012%
Fair Isle SPA	Burnell *et al.* (2023).	860	0.04	0.004%
	Latest count (2024).	326		0.011%
Hoy SPA	Burnell *et al.* (2023).	2,810	0.10	0.004%
	Latest count (2023)*.	514		0.019%

Site	Population count	Population size (breeding adults)	Breeding season predicted collision impacts (breeding adults)	Breeding season percentage point change in survival rate (%)
St Kilda SPA	Burnell *et al.* (2023).	422	<0.01	<0.001%
	Latest count SMP (2024).	140		0.001%
Handa SPA	Burnell *et al.* (2023).	566	0.01	0.001%
	Latest count (2025).	176		0.004%

Table Note: * Latest count derived from Tremlett *et al.* (2024) rather than the SMP database. Colony values have been adjusted based on the % Apparently Occupied Territory coverage where the 2023 survey did not provide full coverage of the SPA.

6.2.19.7 As summarised in **Table 6.108**, for all designated sites considered the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to collision risk during the O&M stage can confidently be ruled out for the Project alone.**

6.2.20 Assessment of great black-backed gull qualifying features

6.2.20.1 The following Section provides consolidated assessments of potential effect pathways on great black-backed gull features of SPAs where potential connectivity or level of predicted impact is considered limited.

6.2.20.2 For the following great black-backed gull features of designated sites, the potential for a LSE was concluded for identified effect pathways, seasons and Project stages as follows:

- East Caithness Cliffs SPA feature for collision risk (non-breeding season only);
- Copinsay SPA feature for collision risk (non-breeding season only);
- Hoy SPA feature for collision risk (non-breeding season only); and
- Calf of Eday SPA feature for collision risk (non-breeding season only).

Conservation objectives

6.2.20.3 Scottish SPAs have been assessed against the following conservation objectives:

- To ensure that the qualifying features of the SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the SPA is restored in the context of environmental changes by meeting the following objectives for each feature:**
  - **the population of the qualifying features are viable components of the SPA;**
  - the distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at the SPA.

6.2.20.4 The conservation objectives of relevance to the assessments presented are highlighted in bold, based on the proximity of the designated sites, functional linkages and potential impact pathways identified.

Apportionment summary for designated sites considered

6.2.20.5 As detailed within **Section 6.2.3**, an apportionment process has been undertaken seasonally to understand the level of predicted impact apportioned to individual designated sites. For the great skua features of designated sites considered within this Section, a summary of the apportioning rates used to inform assessments is provided within **Table 6.109**. Further detail of how these apportioning rates have been derived is provided in **Appendix C**. To note, great black-backed gulls were only screened in for assessment during the non-breeding season only, due to the Project being outwith of great black-backed gulls foraging range from any designated site. Therefore, no apportionment was required for the breeding season.

Table 6.109 Great black-backed gull apportionment results to inform assessment

Designated site	Non-breeding season apportioning rate (%)
East Caithness Cliffs SPA	0.19%
Copinsay SPA	0.24%
Hoy SPA	0.02%
Calf of Eday SPA	0.09%

Collision risk during the operation and maintenance stage

6.2.20.6 The level of predicted impact in relation to collision risk during the O&M stage is provided in **Table 6.110** These impact predictions are based on the modelled collision mortality presented within **Table 6.7**, apportioned to the great black-backed gull feature of designated sites considered using the apportioning rates presented in **Table 6.109**. There is no deviation between the preferred approach proposed by the Applicant and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised in **Section 6.2.5** and how this may affect the impact predictions presented.

6.2.20.7 As summarised in **Table 6.110,** for all designated sites considered the level of impact predicted is significantly less than a single breeding adult per annum. Despite exceeding a 0.02% change in adult survival rate, further consideration of the predicted impact via PVA is deemed unnecessary given that the maximum predicted impact apportioned to any single designated site is less than 0.05 breeding adult collisions per annum, less than a single individual over the lifespan of the project. Such a level of predicted impact can be attributed to an artifact of the assessment process and would certainly be considered inconsequential. Therefore, **the potential for an AEoSI in relation to collision risk during the O&M stage can confidently be ruled out for the Project alone.**

Table 6.110 Summary of predicted collision risk during the operation and maintenance stage apportioned to the great black-backed gull feature of distant designated sites following the guidance approach

Site	Population count	Population size (breeding adults)	Non-breeding season predicted collision impacts (breeding adults)	Non-breeding season percentage point change in survival rate (%)
East Caithness Cliffs SPA	Burnell *et al.* (2023)	532	0.03	0.006%
	Latest count (2015 to 2024)	278		0.011%
Copinsay SPA	Burnell *et al.* (2023)	134	0.04	0.030%
	Latest count (2023 - 2024)	97		0.041%
Hoy SPA	Burnell *et al.* (2023)	64	<0.01	0.005%
	Latest count (2024)	12		0.028%
Calf of Eday SPA	Burnell *et al.* (2023)	116	0.01	0.013%

6.2.21 Assessment of kittiwake qualifying features

6.2.21.1 The following Section provides consolidated assessments of potential effect pathways on kittiwake features of more distant SPAs where potential connectivity is limited. Predicted impacts apportioned to distant sites are considered to be lower due to the limited connectivity to the Project.

6.2.21.2 For the following kittiwake features of designated sites, the potential for a LSE was concluded for identified effect pathways, seasons and Project stages as follows:

- North Caithness Cliffs SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Forth Islands SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Copinsay SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Hoy SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- St Abb's Head to Fast Castle SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Fair Isle SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Calf of Eday SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Rousay SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Marwick Head SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- West Westray SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Farne Islands SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Sumburgh Head SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Noss SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Foula SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Hermaness, Saxa Vord and Valla Field SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Cape Wrath SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season); and
- Flamborough and Filey Coast SPA feature for distributional response effects, collision risk and combined effects (non-breeding season only).

Conservation objectives

6.2.21.3 Scottish SPAs have been assessed against the following conservation objectives:

- To ensure that the qualifying features of the SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the SPA is restored in the context of environmental changes by meeting the following objectives for each feature the population of the qualifying features are viable components of the SPA** the distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at the SPA.

6.2.21.4 English SPAs have been assessed against the following conservation objectives based on the impact pathways and level of connectivity considered:

- **Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Birds Directive, by maintaining or restoring** Distribution and extent of habitats of the qualifying features;
- Structure and function of the habitats of the qualifying features; and
- Supporting processes on which the habitats of the qualifying features rely;
- **The population of each of the qualifying features; and**
- Distribution of the qualifying features within the site.

6.2.21.5 The conservation objectives of relevance to the assessments presented are highlighted in bold, based on the proximity of the designated sites, functional linkages and potential impact pathways identified.

Apportionment summary for designated sites considered

6.2.21.6 As detailed within **Section 6.2.3**, an apportionment process has been undertaken seasonally to understand the level of predicted impact apportioned to individual designated sites. For the kittiwake features of designated sites considered within this Section, a summary of the apportioning rates used to inform assessments is provided within **Table 6.111**. Further detail of how these apportioning rates have been derived is provided in **Appendix C**.

Table 6.111 Kittiwake apportionment results to inform assessment

Designated site	Breeding season apportioning rate				Non-breeding season apportionment rate		
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	Return migration rate (%; collision risk only)	Post-breeding migration rate (%; collision risk only)	Non-breeding rate (%; distributional responses only)
North Caithness Cliffs SPA	3.30%	10.00%	69.14%	2.05%	1.94%	1.47%	1.94%
Forth Islands SPA	2.51%	10.00%	69.14%	1.56%	0.59%	0.45%	0.59%
Copinsay SPA	0.73%	10.00%	69.14%	0.45%	0.13%	0.10%	0.13%
Hoy SPA	0.14%	10.00%	69.14%	0.09%	0.08%	0.06%	0.08%
St Abb's Head to Fast Castle SPA	2.20%	10.00%	69.14%	1.37%	0.65%	0.49%	0.65%
Fair Isle SPA	0.25%	10.00%	69.14%	0.16%	0.15%	0.11%	0.15%
Calf of Eday SPA	0.18%	10.00%	69.14%	0.11%	0.14%	0.11%	0.14%
Rousay SPA	0.15%	10.00%	69.14%	0.09%	0.34%	0.26%	0.34%
Marwick Head SPA	0.36%	10.00%	69.14%	0.22%	0.10%	0.08%	0.10%

Designated site	Breeding season apportioning rate				Non-breeding season apportionment rate		
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	Return migration rate (%; collision risk only)	Post-breeding migration rate (%; collision risk only)	Non-breeding rate (%; distributional responses only)
Farne Islands SPA	1.49%	10.00%	69.14%	0.93%	0.66%	0.50%	0.66%
Sumburgh Head SPA	0.37%	10.00%	69.14%	0.23%	0.04%	0.03%	0.04%
Noss SPA	0.05%	10.00%	69.14%	0.03%	0.10%	0.07%	0.10%
Foula SPA	0.11%	10.00%	69.14%	0.07%	0.06%	0.05%	0.06%
Hermaness, Saxa Vord and Valla Field SPA	0.03%	10.00%	69.14%	0.02%	0.07%	0.06%	0.07%
Cape Wrath SPA	0.90%	10.00%	69.14%	0.56%	0.03%	0.02%	0.03%
Flamborough and Filey Coast SPA	N/A	N/A	N/A	N/A	7.19%	5.44%	7.19%

Distributional response during the operation and maintenance stage

6.2.21.7 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.112** These impact predictions are based on the guidance approach preferred displacement and mortality rates presented in **Table 6.6,** apportioned to the kittiwake feature of the designated sites considered using the apportioning rates presented in **Table 6.111**. Based on the evidence provided within **Section 6.2.4**, the Applicant considers there is insufficient evidence to justify a requirement to assess kittiwake for distributional response effects. A guidance approach is presented and assessed based on recommendations within NatureScot's Guidance Note 8 (NatureScot, 2023f).

6.2.21.8 As summarised in **Table 6.112** for all designated sites considered the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.112 Summary of predicted distributional response impacts during the operation and maintenance stage apportioned to the kittiwake feature of distant designated sites following the guidance approach

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 30% Disp; 1 to 3% Mort	Non-breeding; 30% Disp; 1 to 3% Mort	Annual; 30% Disp; 1 to 3% Mort	Breeding; 30% Disp; 1 to 3% Mort	Non-breeding; 30% Disp; 1 to 3% Mort	Annual; 30% Disp; 1 to 3% Mort
North Caithness Cliffs SPA	Burnell *et al.* (2023).	11,142	0.05 to 0.16	0.01 to 0.03	0.06 to 0.19	0.000 to 0.001%	< 0.001%	0.001 to 0.002%
	Latest count (2023 to 2024).	18,608				0.000 to 0.001%	< 0.001%	0.000 to 0.001%
Forth Islands SPA	Burnell *et al.* (2023).	9,084	0.04 to 0.12	0.00 to 0.01	0.04 to 0.13	0.000 to 0.001%	< 0.001%	0.000 to 0.001%
	Latest count (2024).	14,216				0.000 to 0.001%	< 0.001%	0.000 to 0.001%
Copinsay SPA	Burnell *et al.* (2023).	1,910	0.01 to 0.04	<0.01	0.01 to 0.04	0.001 to 0.002%	< 0.001%	0.001 to 0.002%
	Latest count (2024).	670				0.002 to 0.005%	< 0.001%	0.002 to 0.006%
Hoy SPA	Burnell *et al.* (2023).	532	0.00 to 0.01	<0.01	0.00 to 0.01	0.000 to 0.001%	< 0.001%	0.001 to 0.002%
	Burnell *et al.* (2023).	10,300	0.04 to 0.11	0.00 to 0.01	0.04 to 0.12	0.000 to 0.001%	< 0.001%	0.000 to 0.001%

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 30% Disp; 1 to 3% Mort	Non-breeding; 30% Disp; 1 to 3% Mort	Annual; 30% Disp; 1 to 3% Mort	Breeding; 30% Disp; 1 to 3% Mort	Non-breeding; 30% Disp; 1 to 3% Mort	Annual; 30% Disp; 1 to 3% Mort
St Abb's Head to Fast Castle SPA	Latest count (2024).	11,992				0.000 to 0.001%	< 0.001%	0.000 to 0.001%
Fair Isle SPA	Burnell *et al.* (2023).	896	0.00 to 0.01	<0.01	0.00 to 0.01	0.000% to 0.001%	< 0.001%	0.001% to 0.002%
Calf of Eday SPA	Burnell *et al.* (2023).	672	0.00 to 0.01	<0.01	0.00 to 0.01	0.000% to 0.001%	< 0.001%	0.001% to 0.002%
Rousay SPA	Burnell *et al.* (2023).	660	0.00 to 0.01	<0.01	0.00 to 0.01	0.000% to 0.001%	0.000% to 0.001%	0.001% to 0.002%
Marwick Head SPA	Burnell *et al.* (2023).	1,812	0.01 to 0.02	<0.01	0.01 to 0.02	0.000% to 0.001%	< 0.001%	0.000% to 0.001%
	Latest count (2023).	2,878				0.000 % to 0.001%	< 0.001%	0.000% to 0.001%
Farne Islands SPA	Burnell *et al.* (2023).	8,804	0.02 to 0.07	0.00 to 0.01	0.03 to 0.08	0.000% to 0.001%	< 0.001%	0.000% to 0.001%
	Latest count (2024).	5,790				0.000% to 0.001%	< 0.001%	0.000% to 0.001%
Sumburgh Head SPA	Burnell *et al.* (2023).	1,932	0.01 to 0.02	<0.01	0.01 to 0.02	0.000% to 0.001%	< 0.001%	0.000% to 0.001%
	Latest count (2018 to 2023).	691				0.001% to 0.003%	< 0.001%	0.001% to 0.003%

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 30% Disp; 1 to 3% Mort	**Non-breeding; 30% Disp; 1 to 3% Mort**	**Annual; 30% Disp; 1 to 3% Mort**	**Breeding; 30% Disp; 1 to 3% Mort**	**Non-breeding; 30% Disp; 1 to 3% Mort**	**Annual; 30% Disp; 1 to 3% Mort**
Noss SPA	Burnell *et al.* (2023).	358	0.00 to 0.00	<0.01	0.00 to 0.00	0.000% to 0.001%	< 0.001%	0.000% to 0.001%
	Latest count (2024).	154				0.001% to 0.002%	0.000% to 0.001%	0.001% to 0.002%
Foula SPA	Burnell *et al.* (2023).	850	0.00 to 0.01	<0.01	0.00 to 0.01	0.000% to 0.001%	< 0.001%	0.000% to 0.001%
Hermaness, Saxa Vord and Valla Field SPA	Burnell *et al.* (2023).	354	0.00 to 0.00	<0.01	0.00 to 0.00	0.000% to 0.000%	< 0.001%	0.000% to 0.001%
	Latest count (2023).	354				0.000% to 0.000%	< 0.001%	0.000% to 0.001%
Cape Wrath SPA	Burnell *et al.* (2023).	7,244	0.01 to 0.04	<0.01	0.02 to 0.05	0.000% to 0.001%	< 0.001%	0.000% to 0.001%
	Latest count (2017-2023).	6,616				0.000% to 0.001%	< 0.001%	0.000% to 0.001%
Flamborough and Filey Coast SPA	Burnell *et al.* (2023).	45,504	N/A	0.03 to 0.09	0.03 to 0.09	N/A	< 0.001%	< 0.001%
	Latest count (2022).	44,574				N/A	< 0.001%	< 0.001%

Collision risk during the operation and maintenance stage

6.2.21.9 The level of predicted impact in relation to collision risk during the O&M stage is provided in **Table 6.113**. These impact predictions are based on the modelled collision mortality presented within **Table 6.7**, apportioned to the kittiwake feature of designated sites considered using the apportioning rates presented in **Table 6.111**. There is no deviation between the preferred approach proposed by the Applicant and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised in **Section 6.2.5** and how this may affect the impact predictions presented.

6.2.21.10 As summarised in **Table 6.113** for all designated sites considered the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to collision risk during the O&M stage can confidently be ruled out for the Project alone.**

Table 6.113 Summary of predicted collision risk during the operation and maintenance stage apportioned to the kittiwake feature of distant designated sites following the guidance approach

Site	Population count	Population size (breeding adult)	Predicted collision impacts (breeding adults)					Percentage point change in survival rate (%)		
			Breeding	Return migration	Post-breeding migration	Total non-breeding	Annual	Breeding	Non-breeding	Annual
North Caithness Cliffs SPA	Burnell *et al.* (2023).	11,142	0.46	0.20	0.08	0.28	0.75	0.004%	0.003%	0.007%
	Latest count (2023 to 2024).	18,608						0.002%	0.002%	0.004%
Forth Islands SPA	Burnell *et al.* (2023).	9,084	0.35	0.06	0.03	0.09	0.44	0.004%	0.001%	0.005%
	Latest count (2024).	14,216						0.002%	0.001%	0.003%
Copinsay SPA	Burnell *et al.* (2023).	1,910	0.10	0.01	0.01	0.02	0.12	0.005%	0.001%	0.006%
	Latest count (2024).	670						0.015%	0.003%	0.018%
Hoy SPA	Burnell *et al.* (2023).	532	0.02	0.01	<0.01	0.01	0.03	0.004%	0.002%	0.006%
	Burnell *et al.* (2023).	10,300	0.31	0.07	0.03	0.10	0.40	0.003%	0.001%	0.004%

Site	Population count	Population size (breeding adult)	Predicted collision impacts (breeding adults)					Percentage point change in survival rate (%)		
			Breeding	Return migration	Post-breeding migration	Total non-breeding	Annual	Breeding	Non-breeding	Annual
St Abb's Head to Fast Castle SPA	Latest count (2024).	11,992						0.003%	0.001%	0.003%
Fair Isle SPA	Burnell *et al.* (2023).	896	0.04	0.02	0.01	0.02	0.06	0.004%	0.002%	0.006%
Calf of Eday SPA	Burnell *et al.* (2023).	672	0.02	0.01	0.01	0.02	0.05	0.004%	0.003%	0.007%
Rousay SPA	Burnell *et al.* (2023).	660	0.02	0.04	0.01	0.05	0.07	0.003%	0.008%	0.011%
Marwick Head SPA	Burnell *et al.* (2023).	1,812	0.05	0.01	<0.01	0.01	0.06	0.003%	0.001%	0.004%
	Latest count (2023).	2,878						0.002%	0.001%	0.002%
Farne Islands SPA	Burnell *et al.* (2023).	8,804	0.21	0.07	0.03	0.10	0.31	0.002%	0.001%	0.003%
	Latest count (2024).	5,790						0.004%	0.002%	0.005%
Sumburgh Head SPA	Burnell *et al.* (2023).	1,932	0.05	<0.01	<0.01	0.01	0.06	0.003%	<0.001%	0.003%

Site	Population count	Population size (breeding adult)	Predicted collision impacts (breeding adults)					Percentage point change in survival rate (%)		
			Breeding	Return migration	Post-breeding migration	Total non-breeding	Annual	Breeding	Non-breeding	Annual
	Latest count (2018 to 2023).	691						0.008%	0.001%	0.008%
Noss SPA	Burnell *et al.* (2023).	358	0.01	0.01	<0.01	0.01	0.02	0.002%	0.004%	0.006%
	Latest count (2024).	154						0.004%	0.009%	0.014%
Foula SPA	Burnell *et al.* (2023).	850	0.02	0.01	<0.01	0.01	0.02	0.002%	0.001%	0.003%
Hermaness, Saxa Vord and Valla Field SPA	Burnell *et al.* (2023).	354	<0.01	0.01	<0.01	0.01	0.02	0.001%	0.003%	0.004%
	Latest count (2023).	354						0.001%	0.003%	0.004%
Cape Wrath SPA	Burnell *et al.* (2023).	7,244	0.13	<0.01	<0.01	<0.01	0.13	0.002%	<0.001%	0.002%
	Latest count (2017-2023).	6,616						0.002%	<0.001%	0.002%

Site	Population count	Population size (breeding adult)	Predicted collision impacts (breeding adults)					Percentage point change in survival rate (%)		
			Breeding	Return migration	Post-breeding migration	Total non-breeding	Annual	Breeding	Non-breeding	Annual
Flamborough and Filey Coast SPA	Burnell *et al.* (2023).	45,504	N/A	0.74	0.31	1.05	1.05	N/A	0.002%	0.002%
	Latest count (2022).	44,574					1.05	N/A	0.002%	0.002%

Combined effects during the operation and maintenance stage

6.2.21.11 Due to the kittiwake being screened in for assessment of both distributional response and collision risk, there is potential for both pathways to impact the feature combined. Consideration of both impacts combined is presented within **Table 6.114** for the guidance approach to assessment of distributional responses. As previously noted, the Applicant remains of the position that there is no requirement to assess kittiwake for distributional response effects based on the evidence summarised in **Section 6.2.4**.

6.2.21.12 As is standard practice predicted displacement and collision-consequent mortality have been added together to inform the level of predicted combined impact. It's important to note that simply adding both impacts to together is highly likely to lead to an overestimate of impact, as a bird that is displaced cannot consequently collide with a WTG and vice versa.

6.2.21.13 As summarised in **Table 6.114**, for all designated sites considered the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to combined collision risk and distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.114 Summary of predicted combined distributional response and collision risk impact during the operation and maintenance stage apportioned to the kittiwake feature of distant designated sites following the guidance approach

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; CRM+ 30% Disp; 1 to 3% Mort	Non-breeding; CRM+ 30% Disp; 1 to 3% Mort	Annual; CRM+ 30% Disp; 1 to 3% Mort	Breeding; CRM+ 30% Disp; 1 to 3% Mort	Non-breeding; CRM+ 30% Disp; 1 to 3% Mort	Annual; CRM+ 30% Disp; 1 to 3% Mort
North Caithness Cliffs SPA	Burnell *et al.* (2023).	11,142	0.52 to 0.63	0.29 to 0.31	0.81 to 0.94	0.005% to 0.006%	0.003% to 0.003%	0.007% to 0.008%
	Latest count (2023 to 2024).	18,608				0.003% to 0.003%	0.002% to 0.002%	0.004% to 0.005%
Forth Islands SPA	Burnell *et al.* (2023).	9,084	0.39 to 0.48	0.09 to 0.09	0.48 to 0.57	0.004% to 0.005%	0.001% to 0.001%	0.005% to 0.006%
	Latest count (2024).	14,216				0.003% to 0.003%	0.001% to 0.001%	0.003% to 0.004%
Copinsay SPA	Burnell *et al.* (2023).	1,910	0.11 to 0.14	0.02 to 0.02	0.13 to 0.16	0.006% to 0.007%	0.001% to 0.001%	0.007% to 0.008%
	Latest count (2024).	670				0.017% to 0.021%	0.003% to 0.003%	0.020% to 0.024%
Hoy SPA	Burnell *et al.* (2023).	532	0.02 to 0.03	0.01 to 0.01	0.03 to 0.04	0.004% to 0.005%	0.002% to 0.002%	0.007% to 0.008%

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; CRM+ 30% Disp; 1 to 3% Mort	**Non-breeding; CRM+ 30% Disp; 1 to 3% Mort**	**Annual; CRM+ 30% Disp; 1 to 3% Mort**	**Breeding; CRM+ 30% Disp; 1 to 3% Mort**	**Non-breeding; CRM+ 30% Disp; 1 to 3% Mort**	**Annual; CRM+ 30% Disp; 1 to 3% Mort**
St Abb's Head to Fast Castle SPA	Burnell *et al.* (2023).	10,300	0.35 to 0.42	0.10 to 0.10	0.44 to 0.52	0.003% to 0.004%	0.001% to 0.001%	0.004% to 0.005%
	Latest count (2024).	11,992				0.003% to 0.003%	0.001% to 0.001%	0.004% to 0.004%
Fair Isle SPA	Burnell *et al.* (2023).	896	0.04 to 0.05	0.02 to 0.02	0.06 to 0.07	0.005% to 0.005%	0.003% to 0.003%	0.007% to 0.008%
Calf of Eday SPA	Burnell *et al.* (2023).	672	0.03 to 0.03	0.02 to 0.02	0.05 to 0.06	0.004% to 0.005%	0.003% to 0.003%	0.007% to 0.008%
Rousay SPA	Burnell *et al.* (2023).	660	0.02 to 0.03	0.05 to 0.05	0.07 to 0.08	0.003% to 0.004%	0.008% to 0.008%	0.011% to 0.012%
Marwick Head SPA	Burnell *et al.* (2023).	1,812	0.06 to 0.07	0.02 to 0.02	0.07 to 0.08	0.003% to 0.004%	0.001% to 0.001%	0.004% to 0.005%
	Latest count (2023).	2,878				0.002% to 0.002%	0.001% to 0.001%	0.002% to 0.003%
Farne Islands SPA	Burnell *et al.* (2023).	8,804	0.23 to 0.28	0.10 to 0.11	0.33 to 0.39	0.003% to 0.003%	0.001% to 0.001%	0.004% to 0.004%
	Latest count (2024).	5,790				0.004% to 0.005%	0.002% to 0.002%	0.006% to 0.007%

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; CRM+ 30% Disp; 1 to 3% Mort	Non-breeding; CRM+ 30% Disp; 1 to 3% Mort	Annual; CRM+ 30% Disp; 1 to 3% Mort	Breeding; CRM+ 30% Disp; 1 to 3% Mort	Non-breeding; CRM+ 30% Disp; 1 to 3% Mort	Annual; CRM+ 30% Disp; 1 to 3% Mort
Sumburgh Head SPA	Burnell *et al.* (2023).	1,932	0.06 to 0.07	0.01 to 0.01	0.06 to 0.08	0.003% to 0.004%	<0.001%	0.003% to 0.004%
	Latest count (2018 to 2023).	691				0.008% to 0.010%	0.001% to 0.001%	0.009% to 0.011%
Noss SPA	Burnell *et al.* (2023).	358	0.01 to 0.01	0.01 to 0.02	0.02 to 0.02	0.002% to 0.003%	0.004% to 0.004%	0.006% to 0.007%
	Latest count (2024).	154				0.005% to 0.006%	0.010% to 0.010%	0.015% to 0.016%
Foula SPA	Burnell *et al.* (2023).	850	0.02 to 0.02	0.01 to 0.01	0.03 to 0.03	0.002% to 0.003%	0.001% to 0.001%	0.003% to 0.004%
Hermaness, Saxa Vord and Valla Field SPA	Burnell *et al.* (2023).	354	0.01 to 0.01	0.01 to 0.01	0.02 to 0.02	0.001% to 0.002%	0.003% to 0.003%	0.005% to 0.005%
	Latest count (2023).	354				0.001% to 0.002%	0.003% to 0.003%	0.005% to 0.005%
Cape Wrath SPA	Burnell *et al.* (2023).	7,244	0.14 to 0.17	0.00 to 0.00	0.15 to 0.18	0.002% to 0.002%	0.000% to 0.000%	0.002% to 0.002%
	Latest count (2017 to 2023).	6,616				0.002% to 0.003%	0.000% to 0.000%	0.002% to 0.003%

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; CRM+ 30% Disp; 1 to 3% Mort	**Non-breeding; CRM+ 30% Disp; 1 to 3% Mort**	**Annual; CRM+ 30% Disp; 1 to 3% Mort**	**Breeding; CRM+ 30% Disp; 1 to 3% Mort**	**Non-breeding; CRM+ 30% Disp; 1 to 3% Mort**	**Annual; CRM+ 30% Disp; 1 to 3% Mort**
Flamborough and Filey Coast SPA	Burnell *et al.* (2023).	45,504	N/A	1.09 to 1.15	1.09 to 1.15	N/A	0.002% to 0.003%	0.002% to 0.003%
	Latest count (2022).	44,574				N/A	0.002% to 0.003%	0.002% to 0.003%

6.2.22 Assessment of razorbill qualifying features

6.2.22.1 The following Section provides consolidated assessments of potential effect pathways on razorbill features of more distant SPAs where potential connectivity is limited. Predicted impacts apportioned to distant sites are considered to be lower due to the limited connectivity to the Project.

6.2.22.2 For the following razorbill features of designated sites, the potential for a LSE was concluded for identified effect pathways, seasons and Project stages as follows:

- Troup, Pennan and Lion's Heads SPA feature for distributional response effects (breeding and non-breeding season);
- Fowlsheugh SPA feature for distributional response effects (non-breeding season only);
- East Caithness Cliffs SPA feature for distributional response effects (non-breeding season only);
- North Caithness Cliffs SPA feature for distributional response effects (non-breeding season only);
- Forth Islands SPA feature for distributional response effects (non-breeding season only);
- St Abb's Head to Fast Castle SPA feature for distributional response effects (non-breeding season only);
- Fair Isle SPA feature for distributional response effects (breeding and non-breeding season);
- West Westray SPA feature for distributional response effects (non-breeding season only);
- Foula SPA feature for distributional response effects (non-breeding season only); and
- Flamborough and Filey Coast SPA feature for distributional response effects (non-breeding season only).

Conservation objectives

6.2.22.3 Scottish SPAs have been assessed against the following conservation objectives:

- To ensure that the qualifying features of the SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the SPA is restored in the context of environmental changes by meeting the following objectives for each feature:**
  - **the population of the qualifying features are viable components of the SPA;**
  - the distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at the SPA.

6.2.22.4 English SPAs have been assessed against the following conservation objectives based on the impact pathways and level of connectivity considered:

- Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Birds Directive, by maintaining or restoring;
- Distribution and extent of habitats of the qualifying features;
- Structure and function of the habitats of the qualifying features; and
- Supporting processes on which the habitats of the qualifying features rely;
- The population of each of the qualifying features; and
- Distribution of the qualifying features within the site.

6.2.22.5 The conservation objectives of relevance to the assessments presented are highlighted in bold, based on the proximity of the designated sites, functional linkages and potential impact pathways identified.

Apportionment summary for designated sites considered

6.2.22.6 As detailed within **Section 6.2.3**, an apportionment process has been undertaken seasonally to understand the level of predicted impact apportioned to individual designated sites. For the razorbill features of designated sites considered within this Section, a summary of the apportioning rates used to inform assessments is provided within **Table 6.115**. Further detail of how these apportioning rates have been derived is provided in **Appendix C**.

Table 6.115 Razorbill apportionment results to inform assessment

Designated site	Breeding season apportioning rate				Non-breeding season apportionment rate (%)
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	
Fowlsheugh SPA	N/A	N/A	N/A	N/A	0.97%
East Caithness Cliffs SPA	N/A	N/A	N/A	N/A	3.43%
North Caithness Cliffs SPA	N/A	N/A	N/A	N/A	0.47%
Forth Islands SPA	N/A	N/A	N/A	N/A	0.72%
St Abb's Head to Fast Castle SPA	N/A	N/A	N/A	N/A	0.33%
Fair Isle SPA	4.85%	7.00%	58.58%	2.64%	0.25%

Designated site	Breeding season apportioning rate				Non-breeding season apportionment rate (%)
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	
West Westray SPA	N/A	N/A	N/A	N/A	0.15%
Foula SPA	N/A	N/A	N/A	N/A	0.10%
Flamborough and Filey Coast SPA	N/A	N/A	N/A	N/A	2.74%

Distributional response during the operation and maintenance stage

6.2.22.7 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.116** and **Table 6.117**. These impact predictions are based on abundance and consequent mortality following both the Developer and guidance preferred displacement and mortality rates presented in **Table 6.6**, apportioned to the razorbill feature of the designated sites considered using the apportioning rates presented in **Table 6.115** The appropriateness of the proposed displacement and mortality rates for the Developer and guidance approaches are summarised within **Section 6.2.4.**

6.2.22.8 As summarised in **Table 6.116** and **Table 6.117**, regardless of the approach taken the level of impacted predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.116 Summary of predicted distributional response impacts during the operation and maintenance stage apportioned to the razorbill feature of distant designated sites following the Developer approach

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 50% Disp; 0 to 1% Mort	Non-breeding; 50% Disp; 0 to 1% Mort	Annual; 50% Disp; 0 to 1% Mort	Breeding; 50% Disp; 0 to 1% Mort	Non-breeding; 50% Disp; 0 to 1% Mort	Annual; 50% Disp; 0 to 1% Mort
Fowlsheugh SPA	Burnell *et al.* (2023).	18,844	N/A	0.00 to 0.06	0.00 to 0.06	N/A	<0.001%	<0.001%
	Latest count (2018 to 2023).	20,869				N/A	<0.001%	<0.001%
East Caithness Cliffs SPA	Burnell *et al.* (2023).	40,373	N/A	0.00 to 0.21	0.00 to 0.21	N/A	0.000% to 0.001%	0.000% to 0.001%
	Latest count (2024).	33,023				N/A	0.000% to 0.001%	0.000% to 0.001%
North Caithness Cliffs SPA	Burnell *et al.* (2023).	4,796	N/A	0.00 to 0.03	0.00 to 0.03	N/A	0.000% to 0.001%	0.000% to 0.001%
	Latest count (2015 to 2024).	12,362				N/A	<0.001%	<0.001%
Forth Islands SPA	Burnell *et al.* (2023).	7,631	N/A	0.00 to 0.04	0.00 to 0.04	N/A	0.000% to 0.001%	0.000% to 0.001%
	Latest count (2024).	8,375				N/A	0.000% to 0.001%	0.000% to 0.001%

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 50% Disp; 0 to 1% Mort	Non-breeding; 50% Disp; 0 to 1% Mort	Annual; 50% Disp; 0 to 1% Mort	Breeding; 50% Disp; 0 to 1% Mort	Non-breeding; 50% Disp; 0 to 1% Mort	Annual; 50% Disp; 0 to 1% Mort
St Abb's Head to Fast Castle SPA	Burnell *et al.* (2023).	3,928	N/A	0.00 to 0.02	0.00 to 0.02	N/A	0.000% to 0.001%	0.000% to 0.001%
	Latest count (2024).	3,484				N/A	0.000% to 0.001%	0.000% to 0.001%
Fair Isle SPA	Burnell *et al.* (2023).	2,580	0.00 to 0.05	0.00 to 0.02	0.00 to 0.06	0.000 to 0.002%	0.000% to 0.001%	0.000% to 0.002%
West Westray SPA	Burnell *et al.* (2023).	2,893	N/A	0.00 to 0.01	0.00 to 0.01	N/A	<0.001%	<0.001%
	Latest count (2017 to 2023).	2,857				N/A	<0.001%	<0.001%
Foula SPA	Burnell *et al.* (2023).	635	N/A	0.00 to 0.01	0.00 to 0.01	N/A	0.000% to 0.001%	0.000% to 0.001%
Flamborough and Filey Coast SPA	Burnell *et al.* (2023).	37,476	N/A	0.00 to 0.17	0.00 to 0.17	N/A	<0.001%	<0.001%
	Latest count (2022).	61,345				N/A	<0.001%	<0.001%

Table 6.117 Summary of predicted distributional response impacts during the operation and maintenance stage apportioned to the razorbill feature of distant designated sites following the guidance approach

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 60% Disp; 3 to 5% Mort	Non-breeding; 60% Disp; 1 to 3% Mort	Annual*; 60% Disp; 1 to 5% Mort	Breeding; 60% Disp; 3 to 5% Mort	Non-breeding; 60% Disp; 1 to 3% Mort	Annual*; 60% Disp; 1 to 5% Mort
Fowlsheugh SPA	Burnell *et al.* (2023).	18,844	N/A	0.07 to 0.21	0.07 to 0.21	N/A	0.000% to 0.001%	0.000% to 0.001%
	Latest count (2018 to 2023).	20,869				N/A	0.000% to 0.001%	0.000% to 0.001%
East Caithness Cliffs SPA	Burnell *et al.* (2023).	40,373	N/A	0.25 to 0.75	0.25 to 0.75	N/A	0.001% to 0.002%	0.001% to 0.002%
	Latest count (2024).	33,023				N/A	0.001% to 0.002%	0.001% to 0.002%
North Caithness Cliffs SPA	Burnell *et al.* (2023).	4,796	N/A	0.03 to 0.10	0.03 to 0.10	N/A	0.001% to 0.002%	0.001% to 0.002%
	Latest count (2015 to 2024).	12,362				N/A	0.000% to 0.001%	0.000% to 0.001%
Forth Islands SPA	Burnell *et al.* (2023).	7,631	N/A	0.05 to 0.16	0.05 to 0.16	N/A	0.001% to 0.002%	0.001% to 0.002%
	Latest count (2024).	8,375				N/A	0.001% to 0.002%	0.001% to 0.002%

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 60% Disp; 3 to 5% Mort	Non-breeding; 60% Disp; 1 to 3% Mort	Annual*; 60% Disp; 1 to 5% Mort	Breeding; 60% Disp; 3 to 5% Mort	Non-breeding; 60% Disp; 1 to 3% Mort	Annual*; 60% Disp; 1 to 5% Mort
St Abb's Head to Fast Castle SPA	Burnell *et al.* (2023).	3,928	N/A	0.02 to 0.07	0.02 to 0.07	N/A	0.001% to 0.002%	0.001% to 0.002%
	Latest count (2024).	3,484				N/A	0.001% to 0.002%	0.001% to 0.002%
Fair Isle SPA	Burnell *et al.* (2023).	2,580	0.17 to 0.28	0.02 to 0.05	0.19 to 0.34	0.007 to 0.011%	0.001% to 0.002%	0.007% to 0.013%
West Westray SPA	Burnell *et al.* (2023).	2,893	N/A	0.01 to 0.03	0.01 to 0.03	N/A	0.000% to 0.001%	0.000% to 0.001%
	Latest count (2017 to 2023).	2,857				0.007 to 0.011%	0.000% to 0.001%	0.000% to 0.001%
Foula SPA	Burnell *et al.* (2023).	635	N/A	0.01 to 0.02	0.01 to 0.02	N/A	0.001% to 0.003%	0.001% to 0.003%
Flamborough and Filey Coast SPA	Burnell *et al.* (2023).	37,476	N/A	0.20 to 0.60	0.20 to 0.60	0.007 to 0.011%	0.001% to 0.002%	0.001% to 0.002%
	Latest count (2022).	61,345				N/A	0.000% to 0.001%	0.000% to 0.001%

Table Note: *As summarised in **Table 6.6**, a mortality rate of 3 to 5% has been applied during the breeding season and a mortality rate of 1 to 3% has been applied during the non-breeding season

6.2.23 Assessment of puffin qualifying features

6.2.23.1 The following Section provides consolidated assessments of potential effect pathways on puffin features of SPAs where potential connectivity is limited. Predicted impacts apportioned to distant sites are considered to be lower due to the limited connectivity to the Project.

6.2.23.2 For the following puffin features of designated sites, the potential for a LSE was concluded for identified effect pathways, seasons and Project stages as follows:

- North Caithness Cliffs SPA feature for distributional response effects (breeding and non-breeding season);
- Hoy SPA feature for distributional response effects (breeding and non-breeding season);
- Fair Isle SPA feature for distributional response effects (breeding and non-breeding season);
- Farne Islands SPA feature for distributional response effects (non-breeding season only);
- Sule Skerry and Sule Stack SPA feature for distributional response effects (breeding and non-breeding season);
- Noss SPA feature for distributional response effects (breeding and non-breeding season);
- Foula SPA feature for distributional response effects (breeding and non-breeding season); and
- Hermaness, Saxa Vord and Valla Field SPA feature for distributional response effects (non-breeding season only).

Conservation objectives

6.2.23.3 Scottish SPAs have been assessed against the following conservation objectives:

- To ensure that the qualifying features of the SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the SPA is restored in the context of environmental changes by meeting the following objectives for each feature:**
  - **The population of the qualifying features are viable components of the SPA;**
  - The distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
  - The supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at the SPA.

6.2.23.4 English SPAs have been assessed against the following conservation objectives based on the impact pathways and level of connectivity considered:

- **Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Birds Directive, by maintaining or restoring;**
- Distribution and extent of habitats of the qualifying features;

- Structure and function of the habitats of the qualifying features; and
- Supporting processes on which the habitats of the qualifying features rely;
- **The population of each of the qualifying features; and**
- Distribution of the qualifying features within the site.

6.2.23.5 The conservation objectives of relevance to the assessments presented are highlighted in bold, based on the proximity of the designated sites, functional linkages and potential impact pathways identified.

Apportionment summary for designated sites considered

6.2.23.6 As detailed within **Section 6.2.3**, an apportionment process has been undertaken seasonally to understand the level of predicted impact apportioned to individual designated sites. For the puffin features of designated sites considered within this Section, a summary of the apportioning rates used to inform assessments is provided within **Table 6.118**. Further detail of how these apportioning rates have been derived is provided in **Appendix C**.

Table 6.118 Puffin apportionment results to inform assessment

Designated site	Breeding season apportioning rate				Non-breeding season apportionment rate (%)
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	
North Caithness Cliffs SPA	3.85%	7%	94.07%	3.37%	0.13%
Hoy SPA	0.48%	7%	94.07%	0.42%	0.45%
Fair Isle SPA	7.57%	7%	94.07%	6.62%	1.38%
Farne Islands SPA	N/A	N/A	N/A	N/A	17.23%
Sule Skerry and Sule Stack SPA	26.95%	7%	94.07%	23.58%	0.05%
Noss SPA	0.69%	7%	94.07%	0.60%	0.10%
Foula SPA	2.23%	7%	94.07%	1.95%	2.91%
Hermaness, Saxa Vord and Valla Field SPA	N/A	N/A	N/A	N/A	3.06%

Distributional response during the operation and maintenance stage

6.2.23.7 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.119** and **Table 6.120** These impact predictions are based on abundance and consequent mortality following both the Developer and guidance preferred displacement and mortality rates presented in **Table 6.6**, apportioned to the puffin feature of the designated sites considered using the apportioning rates presented in **Table 6.118.** The appropriateness of the proposed displacement and mortality rates for the Developer and guidance approaches are summarised within **Section 6.2.4**.

6.2.23.8 As summarised in **Table 6.119** and **Table 6.120**, regardless of the approach taken the level of impacted predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.119 Summary of predicted distributional response impacts during the operation and maintenance stage apportioned to the puffin feature of distant designated sites following the Developer approach

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 50% Disp; 0 to 1% Mort	Non-breeding; 50% Disp; 0 to 1% Mort	Annual; 50% Disp; 0 to 1% Mort	Breeding; 50% Disp; 0 to 1% Mort	Non-breeding; 50% Disp; 0 to 1% Mort	Annual; 50% Disp; 0 to 1% Mort
North Caithness Cliffs SPA	Burnell *et al.* (2023).	6,078	0.00 to 0.09	0.00 to <0.01	0.00 to 0.09	0.000% to 0.002%	<0.001%	0.000% to 0.002%
	Latest count (2016 to 2024).	6,766				0.000% to 0.001%	<0.001%	0.000% to 0.001%
Hoy SPA	Burnell *et al.* (2023).	860	0.00 to 0.01	0.00 to <0.01	0.00 to 0.01	0.000% to 0.001%	<0.001%	0.000% to 0.001%
Fair Isle SPA	Burnell *et al.* (2023).	13,332	0.00 to 0.18	0.00 to <0.01	0.00 to 0.19	0.000% to 0.001%	<0.001%	0.000% to 0.001%
Farne Islands SPA	Burnell *et al.* (2023).	87,504	N/A	0.00 to 0.04	0.00 to 0.04	N/A	<0.001%	<0.001%
	Latest count (2024).	100,206				N/A	<0.001%	<0.001%
Sule Skerry and Sule Stack SPA	Burnell *et al.* (2023).	95,484	0.00 to 0.65	0.00 to <0.01	0.00 to 0.65	0.000% to 0.001%	<0.001%	0.000% to 0.001%
Noss SPA	Burnell *et al.* (2023).	2,348	0.00 to 0.02	0.00 to <0.01	0.00 to 0.02	0.000% to 0.001%	<0.001%	0.000% to 0.001%

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 50% Disp; 0 to 1% Mort	Non-breeding; 50% Disp; 0 to 1% Mort	Annual; 50% Disp; 0 to 1% Mort	Breeding; 50% Disp; 0 to 1% Mort	Non-breeding; 50% Disp; 0 to 1% Mort	Annual; 50% Disp; 0 to 1% Mort
	Latest count (2023).	1,090				0.000% to 0.002%	<0.001%	0.000% to 0.002%
Foula SPA	Burnell *et al.* (2023).	8,468	0.00 to 0.05	0.00 to 0.01	0.00 to 0.06	0.000% to 0.001%	<0.001%	0.000% to 0.001%
Hermaness, Saxa Vord and Valla Field SPA	Burnell *et al.* (2023).	28,750	N/A	0.00 to 0.01	0.00 to 0.01	N/A	<0.001%	<0.001%

Table 6.120 Summary of predicted distributional response impacts during the operation and maintenance stage apportioned to the puffin feature of distant designated sites following the guidance approach

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 60% Disp; 3 to 5% Mort	Non-breeding; 60% Disp; 1 to 3% Mort	Annual; 60% Disp; 1 to 5% Mort	Breeding; 60% Disp; 3 to 5% Mort	Non-breeding; 60% Disp; 1 to 3% Mort	Annual; 60% Disp; 1 to 5% Mort
North Caithness Cliffs SPA	Burnell *et al.* (2023).	6,078	0.34 to 0.56	<0.01	0.34 to 0.56	0.006% to 0.009%	<0.001%	0.006% to 0.009%
	Latest count (2016 to 2024).	6,766				0.005% to 0.008%	<0.001%	0.005% to 0.008%
Hoy SPA	Burnell *et al.* (2023).	860	0.04 to 0.04	<0.01	0.04 to 0.05	0.005% to 0.005%	<0.001%	0.005% to 0.005%
Fair Isle SPA	Burnell *et al.* (2023).	13,332	0.66 to 1.10	0.00 to 0.01	0.66 to 1.11	0.005% to 0.008%	<0.001%	0.005% to 0.008%
Farne Islands SPA	Burnell *et al.* (2023).	87,504	N/A	0.05 to 0.16	0.05 to 0.16	N/A	<0.001%	<0.001%
	Latest count (2024).	100,206				N/A	<0.001%	<0.001%
Sule Skerry and Sule Stack SPA	Burnell *et al.* (2023).	95,484	2.35 to 3.92	<0.01	2.35 to 3.92	0.002% to 0.004%	<0.001%	0.002% to 0.004%
Noss SPA	Burnell *et al.* (2023).	2,348	0.06 to 0.10	<0.01	0.06 to 0.10	0.003% to 0.004%	<0.001%	0.003% to 0.004%

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 60% Disp; 3 to 5% Mort	Non-breeding; 60% Disp; 1 to 3% Mort	Annual; 60% Disp; 1 to 5% Mort	Breeding; 60% Disp; 3 to 5% Mort	Non-breeding; 60% Disp; 1 to 3% Mort	Annual; 60% Disp; 1 to 5% Mort
	Latest count (2023).	1,090				0.005% to 0.009%	<0.001%	0.006% to 0.009%
Foula SPA	Burnell *et al.* (2023).	8,468	0.19 to 0.32	0.01 to 0.03	0.20 to 0.35	0.002% to 0.004%	<0.001%	0.002% to 0.004%
Hermaness, Saxa Vord and Valla Field SPA	Burnell *et al.* (2023).	28,750	N/A	0.01 to 0.03	0.01 to 0.03	N/A	<0.001%	<0.001%

Table Note: *As summarised in **Table 6.6**, a mortality rate of 3 to 5% has been applied during the breeding season and a mortality rate of 1 to 3% has been applied during the non-breeding season.

6.2.24 Assessment of gannet qualifying features

6.2.24.1 The following Section provides consolidated assessments of potential effect pathways on gannet features of SPAs where potential connectivity is limited. Predicted impacts apportioned to distant sites are considered to be lower due to the limited connectivity to the Project.

6.2.24.2 For the following gannet features of designated sites, the potential for a LSE was concluded for identified effect pathways, seasons and Project stages as follows:

- Fair Isle SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Sule Skerry and Sule Stack SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);Noss SPA
- North Rona and Sula Sgeir SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season);
- Hermaness, Saxa Vord and Valla Field SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season); and
- Flamborough and Filey Coast SPA feature for distributional response effects, collision risk and combined effects (breeding and non-breeding season).

Conservation objectives

6.2.24.3 Scottish SPAs have been assessed against the following conservation objectives:

- To ensure that the qualifying features of the SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the SPA is restored in the context of environmental changes by meeting the following objectives for each feature:**
  - **The population of the qualifying features are viable components of the SPA;**
  - The distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
  - The supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at the SPA.

6.2.24.4 English SPAs have been assessed against the following conservation objectives based on the impact pathways and level of connectivity considered:

- **Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Birds Directive, by maintaining or restoring;**
- Distribution and extent of habitats of the qualifying features;
- Structure and function of the habitats of the qualifying features; and
- Supporting processes on which the habitats of the qualifying features rely;
- **The population of each of the qualifying features; and**
- Distribution of the qualifying features within the site.

6.2.24.5 The conservation objectives of relevance to the assessments presented are highlighted in bold, based on the proximity of the designated sites, functional linkages and potential impact pathways identified.

Apportionment summary for designated sites considered

6.2.24.6 As detailed within **Section 6.2.3**, an apportionment process has been undertaken seasonally to understand the level of predicted impact apportioned to individual designated sites. For the gannet features of designated sites considered within this Section, a summary of the apportioning rates used to inform assessments is provided within **Table 6.121**. Further detail of how these apportioning rates have been derived is provided in **Appendix C**.

Table 6.121 Gannet apportionment results to inform assessment

Designated site	Breeding season apportioning rate				Non-breeding season apportionment rate		
	Colony apportionment Rate (%)	Sabbatical rate (%)	Adult / immature ratio rate (%)	Overall apportionment rate (%)	Return migration rate (%; collision risk only)	Post-breeding migration rate (%; collision risk only)	Non-breeding rate (%; distributional responses only)
Fair Isle SPA	5.17%	10.00%	68.36%	3.18%	2.21%	1.38%	1.38%
Sule Skerry and Sule Stack SPA	4.00%	10.00%	68.36%	2.46%	0.00%	0.20%	0.20%
Noss SPA	7.86%	10.00%	68.36%	4.84%	5.51%	3.42%	3.42%
North Rona and Sula Sgeir SPA	2.93%	10.00%	68.36%	1.80%	0.00%	0.40%	0.40%
Hermaness, Saxa Vord and Valla Field SPA	8.62%	10.00%	68.36%	5.30%	13.73%	8.54%	8.54%
Flamborough and Filey Coast SPA	N/A	N/A	N/A	N/A	6.23%	4.85%	4.85%

Distributional response during the operation and maintenance stage

6.2.24.7 The level of predicted impact in relation to distributional responses during the O&M stage is provided in **Table 6.122** and **Table 6.123**. These impact predictions are based on abundance and consequent mortality following both the Developer and guidance preferred displacement and mortality rates presented in **Table 6.6**, apportioned to the gannet feature of the designated sites considered using the apportioning rates presented in **Table 6.121**. The appropriateness of the proposed displacement and mortality rates for the Developer and guidance approaches are summarised within **Section 6.2.4.**

6.2.24.8 As summarised in **Table 6.122** and **Table 6.123,** regardless of the approach taken the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.122 Summary of predicted distributional response impacts during the operation and maintenance stage apportioned to the gannet feature of distant designated sites following the Developer approach

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 60 to 80% Disp; 1% Mort*	Non-breeding; 60 to 80% Disp; 1% Mort*	Annual; 60 to 80% Disp; 1% Mort*	Breeding; 60 to 80% Disp; 1% Mort*	Non-breeding; 60 to 80% Disp; 1% Mort*	Annual; 60 to 80% Disp; 1% Mort*
Fair Isle SPA	Burnell *et al.* (2023).	9,942	0.12 to 0.16	0.03 to 0.03	0.15 to 0.20	0.001% to 0.002%	<0.001%	0.001% to 0.002%
	Latest count (2024).	11,184				0.001% to 0.001%	<0.001%	0.001% to 0.002%
Sule Skerry and Sule Stack SPA	Burnell *et al.* (2023).	18,130	0.09 to 0.13	0.00 to 0.00	0.10 to 0.13	0.001% to 0.001%	<0.001%	0.001% to 0.001%
	Latest count (2013 to 2024).	15,648				0.001% to 0.001%	<0.001%	0.001% to 0.001%
Noss SPA	Burnell *et al.* (2023).	27,530	0.19 to 0.25	0.06 to 0.08	0.25 to 0.33	0.001% to 0.001%	<0.001%	0.001% to 0.001%
	Latest count (2023).	24,670				0.001% to 0.001%	<0.001%	0.001% to 0.001%
North Rona and Sula Sgeir SPA	Burnell *et al.* (2023).	24,542	0.07 to 0.09	0.01 to 0.01	0.08 to 0.10	<0.001%	<0.001%	<0.001%
	Latest count (2023).	18,990				<0.001%	<0.001%	0.000% to 0.001%

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 60 to 80% Disp; 1% Mort*	Non-breeding; 60 to 80% Disp; 1% Mort*	Annual; 60 to 80% Disp; 1% Mort*	Breeding; 60 to 80% Disp; 1% Mort*	Non-breeding; 60 to 80% Disp; 1% Mort*	Annual; 60 to 80% Disp; 1% Mort*
Hermaness, Saxa Vord and Valla Field SPA	Burnell *et al.* (2023).	59,124	0.20 to 0.27	0.16 to 0.21	0.36 to 0.48	<0.001%	<0.001%	0.001% to 0.001%
	Latest count (2024).	39,606				0.001% to 0.001%	0.000% to 0.001%	0.001% to 0.001%
Flamborough and Filey Coast SPA	Burnell *et al.* (2023).	26,784	N/A	0.09 to 0.12	0.09 to 0.12	N/A	<0.001%	<0.001%
	Latest count (2024).	31,588				N/A	<0.001%	<0.001%

Table Note: * For the purposes of presenting the range of potential displacement effects the worst-case scenario of a 1% mortality rate only is presented. Please note however, as concluded within **Section 6.2.4**, there is potential that the consequential mortality rate could be less than 1%.

Table 6.123 Summary of predicted distributional response impacts during the operation and maintenance stage apportioned to the gannet feature of distant designated sites following the guidance approach

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 70% Disp; 1 to 3% Mort	Non-breeding; 70% Disp; 1 to 3% Mort	Annual; 70% Disp; 1 to 3% Mort	Breeding; 70% Disp; 1 to 3 % Mort	Non-breeding; 70% Disp; 1 to 3% Mort	Annual; 70% Disp; 1 to 3% Mort
Fair Isle SPA	Burnell *et al.* (2023).	9,942	0.14 to 0.43	0.03 to 0.09	0.17 to 0.52	0.001% to 0.004%	0.000% to 0.001%	0.002% to 0.005%
	Latest count (2024).	11,184				0.001% to 0.004%	0.000% to 0.001%	0.002% to 0.005%
Sule Skerry and Sule Stack SPA	Burnell *et al.* (2023).	18,130	0.11 to 0.33	0.00 to 0.01	0.11 to 0.34	0.001% to 0.002%	<0.001%	0.001% to 0.002%
	Latest count (2013 to 2024).	15,648				0.001% to 0.002%	<0.001%	0.001% to 0.002%
Noss SPA	Burnell *et al.* (2023).	27,530	0.22 to 0.65	0.07 to 0.22	0.29 to 0.87	0.001% to 0.002%	0.000% to 0.001%	0.001% to 0.003%
	Latest count (2023).	24,670				0.001% to 0.003%	0.000% to 0.001%	0.001% to 0.004%
North Rona and Sula Sgeir SPA	Burnell *et al.* (2023).	24,542	0.08 to 0.24	0.01 to 0.03	0.09 to 0.27	0.000% to 0.001%	<0.001%	0.000% to 0.001%
	Latest count (2023).	18,990				0.000% to 0.001%	<0.001%	0.000% to 0.001%

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; 70% Disp; 1 to 3% Mort	Non-breeding; 70% Disp; 1 to 3% Mort	Annual; 70% Disp; 1 to 3% Mort	Breeding; 70% Disp; 1 to 3 % Mort	Non-breeding; 70% Disp; 1 to 3% Mort	Annual; 70% Disp; 1 to 3% Mort
Hermaness, Saxa Vord and Valla Field SPA	Burnell *et al.* (2023).	59,124	0.24 to 0.71	0.18 to 0.55	0.42 to 1.26	0.000% to 0.001%	0.000% to 0.001%	0.001% to 0.002%
	Latest count (2024).	39,606				0.001% to 0.002%	0.000% to 0.001%	0.001% to 0.003%
Flamborough and Filey Coast SPA	Burnell *et al.* (2023).	26,784	N/A	0.10 to 0.31	0.10 to 0.31	N/A	0.000% to 0.001%	0.000% to 0.001%
	Latest count (2024).	31,588				N/A	0.000% to 0.001%	0.000% to 0.001%

Collision risk during the operation and maintenance stage

6.2.24.9 The level of predicted impact in relation to collision risk during the O&M stage is provided in **Table 6.124.** These impact predictions are based on the modelled collision mortality presented within **Table 6.7** apportioned to the gannet feature of designated sites considered using the apportioning rates presented in **Table 6.121**.

6.2.24.10 There is no deviation between the preferred approach proposed by the Applicant and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised in **Section 6.2.5** and how this may affect the impact predictions presented.

6.2.24.11 As summarised in **Table 6.124** for all designated sites considered the level of impact predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to collision risk during the O&M stage can confidently be ruled out for the Project alone.**

Table 6.124 Summary of predicted collision risk during the operation and maintenance stage apportioned to the gannet feature of distant designated sites following the guidance approach

Site	Population count	Population size (breeding adult)	Predicted collision impacts (breeding adults)					Percentage point change in survival rate (%)		
			Breeding	Return migration	Post-breeding migration	Total non-breeding	Annual	Breeding	Non-breeding	Annual
Fair Isle SPA	Burnell *et al.* (2023).	9,942	1.27	0.02	0.03	0.05	1.32	0.013%	0.001%	0.013%
	Latest count (2024).	11,184						0.011%	<0.001%	0.012%
Sule Skerry and Sule Stack SPA	Burnell *et al.* (2023).	18,130	0.98	<0.01	<0.01	<0.01	0.98	0.005%	<0.001%	0.005%
	Latest count (2013 to 2024).	15,648						0.006%	<0.001%	0.006%
Noss SPA	Burnell *et al.* (2023).	27,530	1.93	0.04	0.08	0.13	2.05	0.007%	<0.001%	0.007%
	Latest count (2023).	24,670						0.008%	0.001%	0.008%
North Rona and Sula Sgeir SPA	Burnell *et al.* (2023).	24,542	0.72	<0.01	0.01	0.01	0.73	0.003%	<0.001%	0.003%
	Latest count (2023).	18,990						0.004%	<0.001%	0.004%
	Burnell *et al.* (2023).	59,124	2.11	0.11	0.20	0.31	2.42	0.004%	0.001%	0.004%

Site	**Population count**	**Population size (breeding adult)**	**Predicted collision impacts (breeding adults)**					**Percentage point change in survival rate (%)**		
			Breeding	**Return migration**	**Post-breeding migration**	**Total non-breeding**	**Annual**	**Breeding**	**Non-breeding**	**Annual**
Hermaness, Saxa Vord and Valla Field SPA	Latest count (2024).	39,606						0.005%	0.001%	0.006%
Flamborough and Filey Coast SPA	Burnell *et al.* (2023).	26,784	N/A	0.05	0.11	0.17	0.17	N/A	0.001%	0.001%
	Latest count (2024).	31,588						N/A	0.001%	0.001%

Combined effects during the operation and maintenance stage

6.2.24.12 Due to the gannet feature being screened in for assessment of both distributional response and collision risk, there is potential for both effect pathways to impact the feature combined. Consideration of both impacts combined is presented within **Table 6.125** for the Developer approach to assessment of distributional responses, and **Table 6.126** for the guidance approach to assessment of distributional responses (there is no difference between the Developer and guidance approach for collision risk).

6.2.24.13 As is standard practice predicted displacement and collision consequent mortality have been added together to inform the level of predicted combined impact. It's important to note that simply adding both impacts to together is highly likely to lead to an overestimate of impact, as a bird that is displaced cannot consequently collide with a WTG and vice versa. This overestimation is partially resolved for gannet via the inclusion of macro avoidance behaviour being accounted for when collision risk modelling, though to date NatureScot only recommend the inclusion of such behaviour in the non-breeding season only.

6.2.24.14 As summarised in **Table 6.125** and **Table 6.126**, regardless of the approach taken the level of impacted predicted annually or seasonally does not exceed a 0.02% change in adult survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to combined collision risk and distributional response effects during the O&M stage can confidently be ruled out for the Project alone**.

Table 6.125 Summary of predicted combined distributional response and collision risk impact during the operation and maintenance stage apportioned to the gannet feature of distant designated sites following the guidance approach

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; CRM + 60 to 80% Disp; 1% Mort	Non-breeding; CRM + 60 to 80% Disp; 1% Mort	Annual; CRM + 60 to 80% Disp; 1% Mort	Breeding; CRM + 60 to 80% Disp; 1% Mort	Non-breeding; CRM + 60 to 80% Disp; 1% Mort	Annual; CRM + 60 to 80% Disp; 1% Mort
Fair Isle SPA	Burnell *et al.* (2023).	9,942	1.39 to 1.43	0.08 to 0.08	1.46 to 1.51	0.014% to 0.014%	0.001% to 0.001%	0.015% to 0.015%
	Latest count (2024).	11,184				0.012% to 0.013%	0.001% to 0.001%	0.013% to 0.014%
Sule Skerry and Sule Stack SPA	Burnell *et al.* (2023).	18,130	1.07 to 1.10	0.01 to 0.01	1.08 to 1.11	0.006% to 0.006%	<0.001%	0.006% to 0.006%
	Latest count (2013 to 2024).	15,648				0.007% to 0.007%	<0.001%	0.007% to 0.007%
Noss SPA	Burnell *et al.* (2023).	27,530	2.11 to 2.17	0.19 to 0.21	2.30 to 2.38	0.008% to 0.008%	0.001% to 0.001%	0.008% to 0.009%
	Latest count (2023).	24,670				0.009% to 0.009%	0.001% to 0.001%	0.009% to 0.010%
	Burnell *et al.* (2023).	24,542	0.79 to 0.81	0.02 to 0.02	0.80 to 0.83	0.003% to 0.003%	<0.001%	0.003% to 0.003%

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; CRM + 60 to 80% Disp; 1% Mort	Non-breeding; CRM + 60 to 80% Disp; 1% Mort	Annual; CRM + 60 to 80% Disp; 1% Mort	Breeding; CRM + 60 to 80% Disp; 1% Mort	Non-breeding; CRM + 60 to 80% Disp; 1% Mort	Annual; CRM + 60 to 80% Disp; 1% Mort
North Rona and Sula Sgeir SPA	Latest count (2023).	18,990				0.004% to 0.004%	<0.001%	0.004% to 0.004%
Hermaness, Saxa Vord and Valla Field SPA	Burnell *et al.* (2023).	59,124	2.31 to 2.38	0.47 to 0.52	2.78 to 2.90	0.004% to 0.004%	0.001% to 0.001%	0.005% to 0.005%
	Latest count (2024).	39,606				0.006% to 0.006%	0.001% to 0.001%	0.007% to 0.007%
Flamborough and Filey Coast SPA	Burnell *et al.* (2023).	26,784	N/A	0.25 to 0.28	0.25 to 0.28	N/A	0.001% to 0.001%	0.001% to 0.001%
	Latest count (2024).	31,588				N/A	0.001% to 0.001%	0.001% to 0.001%

Table 6.126 Summary of predicted combined distributional response and collision risk impact during the operation and maintenance stage apportioned to the gannet feature of distant designated sites following the guidance approach

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; CRM+ 70% Disp; 1 to 3% Mort	Non-breeding; CRM+ 70% Disp; 1 to 3% Mort	Annual; CRM+ 70% Disp; 1 to 3% Mort	Breeding; CRM+ 70% Disp; 1 to 3% Mort	Non-breeding; CRM+ 70% Disp; 1 to 3% Mort	Annual; CRM+ 70% Disp; 1 to 3% Mort
Fair Isle SPA	Burnell *et al.* (2023).	9,942	1.41 to 1.69	0.08 to 0.14	1.49 to 1.83	0.014% to 0.017%	0.001% to 0.001%	0.015% to 0.018%
	Latest count (2024).	11,184				0.013% to 0.015%	0.001% to 0.001%	0.013% to 0.016%
Sule Skerry and Sule Stack SPA	Burnell *et al.* (2023).	18,130	1.09 to 1.31	0.01 to 0.02	1.10 to 1.33	0.006% to 0.007%	<0.001%	0.006% to 0.007%
	Latest count (2013 to 2024).	15,648				0.007% to 0.008%	<0.001%	0.007% to 0.008%
Noss SPA	Burnell *et al.* (2023).	27,530	2.14 to 2.58	0.20 to 0.34	2.34 to 2.92	0.008% to 0.009%	0.001% to 0.001%	0.009% to 0.011%
	Latest count (2023).	24,670				0.009% to 0.010%	0.001% to 0.001%	0.009% to 0.012%
	Burnell *et al.* (2023).	24,542	0.80 to 0.96	0.02 to 0.03	0.81 to 0.99	0.003% to 0.004%	<0.001%	0.003% to 0.004%

Site	Population count	Population size (breeding adult)	Predicted distributional response impacts (breeding adults)			Percentage point change in survival rate (%)		
			Breeding; CRM+ 70% Disp; 1 to 3% Mort	Non-breeding; CRM+ 70% Disp; 1 to 3% Mort	Annual; CRM+ 70% Disp; 1 to 3% Mort	Breeding; CRM+ 70% Disp; 1 to 3% Mort	Non-breeding; CRM+ 70% Disp; 1 to 3% Mort	Annual; CRM+ 70% Disp; 1 to 3% Mort
North Rona and Sula Sgeir SPA	Latest count (2023).	18,990				0.004% to 0.005%	<0.001%	0.004% to 0.005%
Hermaness, Saxa Vord and Valla Field SPA	Burnell *et al.* (2023).	59,124	2.35 to 2.82	0.50 to 0.86	2.84 to 3.68	0.004% to 0.005%	0.001% to 0.001%	0.005% to 0.006%
	Latest count (2024).	39,606				0.006% to 0.007%	0.001% to 0.002%	0.007% to 0.009%
Flamborough and Filey Coast SPA	Burnell *et al.* (2023).	26,784	N/A	0.27 to 0.47	0.27 to 0.47	N/A	0.001% to 0.002%	0.001% to 0.002%
	Latest count (2024).	31,588				N/A	0.001% to 0.002%	0.001% to 0.002%

6.2.25 Assessment of seabird assemblage features of designated sites

6.2.25.1 The designated sites for which the seabird assemblage was screened in for assessment during the O&M stage of the Project alone are as follows:

- Buchan Ness to Collieston Coast SPA;
- Troup, Pennan and Lion's Heads SPA;
- Fowlsheugh SPA;
- East Caithness Cliffs SPA
- North Caithness Cliffs SPA;
- Forth Islands SPA;
- Copinsay SPA;
- Hoy SPA;
- St Abb's Head to Fast Castle SPA;
- Fair Isle SPA feature;
- Calf of Eday SPA;
- Rousay SPA;
- Marwick Head SPA;
- West Westray SPA;
- Farne Islands SPA;
- Cape Wrath SPA;
- Sumburgh Head SPA;
- Handa SPA;
- Sule Sule and Sule Stack SPA
- Noss SPA;
- Foula SPA;
- The Shiant Isles SPA;
- North Rona and Sula Sgeir SPA;
- Fetlar SPA;
- Hermaness, Saxa Vord and Valla Field SPA;
- Flannan Isles SPA;
- Flamborough and Filey Coast SPA;
- St Kilda SPA; and
- Mingulay and Berneray SPA.

6.2.25.2 The seabird assemblage of Scottish SPAs have been assessed against the following conservation objectives:

- To ensure that the qualifying features of the SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- **To ensure that the integrity of the SPA is restored in the context of environmental changes by meeting the following objectives for each feature:**
  - **the population of the qualifying features are viable components of the SPA;**
  - the distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at the SPA.

6.2.25.3 The seabird assemblage of English SPAs have been assessed against the following conservation objectives based on the impact pathways and level of connectivity considered:

- **Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Birds Directive, by maintaining or restoring;**
- Distribution and extent of habitats of the qualifying features;
- Structure and function of the habitats of the qualifying features; and
- Supporting processes on which the habitats of the qualifying features rely;
- **The population of each of the qualifying features; and**
- Distribution of the qualifying features within the site.

6.2.25.4 The conservation objectives of relevance to the assessments presented are highlighted in bold, based on the proximity of the designated sites, functional linkages and potential impact pathways identified for components of the seabird assemblage assessed.

6.2.25.5 Species-specific assessments were carried out for qualifying features and named components of the seabird assemblages where the potential for LSE was concluded. The conclusions of these assessments were that for all components (qualifying features and / or named components) of the seabird assemblages considered, an AEoSI could confidently be ruled out from the Project alone for all possible effect pathways.

6.2.25.6 For named components of the seabird assemblage where the potential for a LSE was ruled out, any potential effect on such a component is not considered likely to materially impact the conservation objectives of the seabird assemblage.

6.2.25.7 Therefore, with regard to the conservation objectives of the seabird assemblages screened in for assessment in relation to the O&M stage impacts from the Project alone, **the potential for an AEoSI can also be ruled out. Subject to natural change, the seabird assemblages will be maintained as a feature in the long term**.

6.2.26 Assessment of migratory collision risk

6.2.26.1 The following Section provides a consolidated assessment of migratory collision risk as a potential effect pathway for the following designated sites and features:

- Loch of Strathbeg SPA / Ramsar:
  - Svalbard barnacle goose (*Branta leucopsis*);
  - teal (*Anas crecca*);
  - goldeneye; and

  - waterfowl assemblage.
- Ythan Estuary, Sands of Forvie and Meikle Loch SPA / Ramsar:
  - lapwing;
  - redshank; and
  - waterfowl assemblage.
- Moray Firth SPA:
  - great northern diver;
  - Slavonian grebe (*Podicepts auritus*);
  - long-tailed duck;
  - common scoter;
  - velvet Scoter (*Melanitta fusca*);
  - goldeneye; and
  - red-breasted merganser.
- Loch of Skene SPA:
  - goldeneye; and
  - goosander (*Mergus merganser*).
- Moray and Nairn Coast SPA:
  - red-breasted merganser;
  - wigeon;
  - bar-tailed godwit;
  - redshank;
  - dunlin;
  - oystercatcher; and
  - waterbird assemblage.
- Dornoch Firth and Loch Fleet SPA:
  - wigeon;
  - teal;
  - bar-tailed godwit;
  - curlew;
  - redshank;
  - dunlin;
  - oystercatcher; and
  - waterbird assemblage.
- Inner Moray Firth SPA:

- wigeon;
- teal;
- goldeneye;
- goosander;
- red-breasted merganser;
- bar-tailed godwit;
- curlew;
- redshank;
- oystercatcher; and
- waterbird assemblage.

- Cromarty Firth SPA:
  - red-breasted merganser;
  - pintail;
  - wigeon;
  - bar-tailed godwit;
  - curlew;
  - oystercatcher;
  - dunlin; and
  - waterbird assemblage.
- Caithness and Sutherland Peatlands SPA:
  - Greenshank (*Tringa nebularia*).

6.2.26.2 There is potential that seabirds, waders, passerines, raptors and wildfowl may intersect the OAA whilst undertaking annual migratory movements from breeding and wintering grounds. Such movements are difficult to accurately record by conventional means of survey due to some birds migrating at night, when no surveys are conducted, or in pulse movements which may be missed due to the snapshot nature of monthly surveys. The potential impact of collision on migratory birds has been assessed using the Marine Scotland Avian Migration Collision Risk Model Shiny Application ("mCRM tool"; HiDef Aerial Surveying Limited, 2024), as advised by NatureScot within consultation (see consultation and engagement within **Volume 1, Chapter 12: Offshore and Intertidal Ornithology** of the **EIA Report**). Details of the approach to migratory collision risk modelling and subsequent collision predictions are presented within **Volume 3, Appendix 12.6** of the **EIA Report**.

6.2.26.3 For the majority of migratory species modelled, the annual potential collision prediction was less than a single individual per annum, based on modelling the entire UK population presented in Woodward *et al.* (2023). For species where the total predicted annual collisions for the entire UK population is less than a single individual, it can confidently be concluded that such a level of effect would be non-tangible when apportioned out to individual designated sites. Therefore, **the potential for an AEoSI can confidently be ruled out in relation to migratory collision risk from the Project alone**.

6.2.26.4 When considering the qualifying features and named components of the designated sites screened in for assessment above, the collision predictions for the following species were greater than a single individual per annum for the total UK population modelled:

- common scoter;
- goldeneye;
- wigeon;
- goosander;
- bar-tailed godwit;
- lapwing;
- redshank; and
- dunlin.

6.2.26.5 The potential effects on the above species have been considered further as presented in **Table 6.127** below. Collisions are apportioned to each designated site based on the proportion of the citation population compared to the overall UK population for each qualifying feature.

6.2.26.6 As presented within **Table 6.127**, the annual predicted impact from migratory collision risk is significantly less than a single individual per annum for all features considered. The level of impact predicted annually or seasonally does not exceed a 0.02% change in survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the predicted impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore **the potential for an AEoSI in relation to migratory collision risk during the O&M stage can confidently be ruled out for the Project alone**.

6.2.26.7 Additionally, given the intangible predicted impact apportioned to each component of the waterfowl and waterbird assemblages, the potential for **an AEoSI in relation to migratory collision risk during the O&M stage can confidently be ruled out for the Project alone with respect to assemblages**.

Table 6.127 Migratory collision risk impacts apportioned to designated sites

Species	Designated site	Predicted impact (individuals)	Population at risk of collision within UK waters (individuals)*	Citation population (individuals)	Apportionment rate (%)	Apportioned impact (individuals per annum)	Percentage point change in survival rate (%)
Common scoter	Moray Firth SPA	5.53	134,964	1,733	1.28%	0.07	0.004%
Goldeneye	Loch of Strathbeg SPA / Ramsar	1.87	37,500	150	0.40%	0.01	0.005%
	Moray Firth SPA	1.87	37,500	907	2.42%	0.05	0.005%
	Loch of Skene SPA	1.87	37,500	150	0.40%	0.01	0.005%
	Inner Moray Firth SPA	1.87	37,500	218	0.58%	0.01	0.005%
Wigeon	Moray and Nairn Coast SPA	17.46	480,000	2,600	0.54%	0.09	0.004%
	Dornoch Firth and Loch Fleet SPA	17.46	480,000	15,304	3.19%	0.56	0.004%
	Inner Moray Firth SPA	17.46	480,000	7,310	1.52%	0.27	0.004%
	Cromarty Firth SPA	17.46	480,000	9,204	1.92%	0.33	0.004%
Goosander	Loch of Skene SPA	1.76	17,420	110	0.63%	0.01	0.010%
	Inner Moray Firth SPA	1.76	17,420	325	1.87%	0.03	0.010%
	Moray and Nairn Coast SPA	1.70	680,000	899	0.13%	<0.01	<0.001%

Species	Designated site	Predicted impact (individuals)	Population at risk of collision within UK waters (individuals)*	Citation population (individuals)	Apportionment rate (%)	Apportioned impact (individuals per annum)	Percentage point change in survival rate (%)
Bar-tailed godwit	Dornoch Firth and Loch Fleet SPA	1.70	680,000	1,184	0.17%	<0.01	<0.001%
	Inner Moray Firth SPA	1.70	680,000	1,090	0.16%	<0.01	<0.001%
	Cromarty Firth SPA	1.70	680,000	1,355	0.20%	<0.01	<0.001%
Lapwing	Ythan Estuary, Sands of Forvie and Meikle Loch SPA / Ramsar	10.01	3,942,500	2,542	0.06%	0.01	<0.001%
Redshank	Ythan Estuary, Sands of Forvie and Meikle Loch SPA / Ramsar	1.58	747,000	1,149	0.15%	<0.01	<0.001%
	Moray and Nairn Coast SPA	1.58	747,000	1,690	0.23%	<0.01	<0.001%
	Dornoch Firth and Loch Fleet SPA	1.58	747,000	1,272	0.17%	<0.01	<0.001%
	Inner Moray Firth SPA	1.58	747,000	1,621	0.22%	<0.01	<0.001%
Dunlin	Moray and Nairn Coast SPA	4.49	2,021,808	2,689	0.13%	0.01	<0.001%
	Dornoch Firth and Loch Fleet SPA	4.49	2,021,808	4,088	0.20%	0.01	<0.001%
	Cromarty Firth SPA	4.49	2,021,808	3,384	0.17%	0.01	<0.001%

Table Note: *the population at risk of collision within UK waters was derived from the percentage of the biogeographic population cited within Woodward *et al.* (2023) estimated to be present within UK waters.

6.2.27 Flamborough and Filey Coast SPA - guillemot

6.2.27.1 As recommended through consultation with NatureScot and detailed within NatureScot's Guidance Note 4 (NatureScot, 2023c), a regional approach is advised to apportionment of impacts during the non-breeding season for guillemot. This is based on NatureScot's opinion that guillemots from Scottish colonies remain within the broad vicinity of their breeding colonies during the non-breeding season (NatureScot, 2023b). This advice differs to the recommendations from Natural England for non-breeding season apportionment for guillemot. As noted in **Table 3.1**, this has resulted in Natural England requesting if a specific exception could be made for the guillemot feature of the Flamborough and Filey Coast SPA, to facilitate the inclusion of the Project within future in-combination assessments. This Section provides a summary of the potential effect from distributional responses apportioned to the guillemot feature of Flamborough and Filey Coast SPA when following Natural England's approach to non-breeding season apportionment, and displacement and mortality rates recommended within the Joint SNCB interim advice note on displacement (SNCBs, 2022).

6.2.27.2 Apportionment of impacts is based on calculating the proportion of the breeding adults within the UK North Sea and Channel Biologically Defined Minimum Population Scales (BDMPS) population that can be attributed to the various SPAs as defined by Furness (2015), based on the data within that report. This follows Natural England's best practice guidance (Parker *et al.* 2025). Following this approach to apportionment the calculated non-breeding season apportioning rate alongside predicted impacts are provided in **Table 6.128**.

6.2.27.3 As presented in **Table 6.128,** the level of predicted impact is less than a 1% increase in baseline mortality, which is considered to be indistinguishable from natural fluctuations in the population. With regard to the conservation objectives of the guillemot feature of Flamborough and Filey Coast SPA in relation to distributional response effects during the O&M stage, **the potential for an AEoSI can be confidently ruled out for the Project alone**.

Table 6.128 Flamborough and Filey Coast SPA guillemot feature assessment

Population count	Population size (breeding adult)	Non-breeding apportioning rate (%)	Non-breeding apportioned abundance (OAA plus 2km buffer; breeding adults)	Non-breeding predicted impact; 30 to 70% Disp; 1 to 10% Mort	Non-breeding increase in baseline mortality (%)
Burnell *et al.* (2023)	113,427	4.41%	238	0.71 to 16.68	0.010% to 0.241%
Latest count (2022)	149,980				0.008% to 0.182%

6.2.28 Summary of offshore ornithology alone impacts

6.2.28.1 A summary of the conclusions drawn for all offshore ornithology qualifying features of designated sites assessed is provided in **Table 6.129**.

Table 6.129 Summary of AEoSIs for offshore ornithology

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
Construction				
Buchan Ness to Collieston Cost SPA	Seabird assemblage	The population of the qualifying features are viable components of the Buchan Ness to Collieston Coast SPA.	No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Kittiwake		Considering the species' low vulnerability to noise, lighting and visual disturbance, and the Project's commitment to minimise this using HDD for cable installation, the potential for adverse effects is highly limited for the construction stage.	No AEoSI
	Herring gull		Considering the species' low vulnerability to noise, lighting and visual disturbance, and the Project's commitment to minimise this using HDD for cable installation, the potential for adverse effects is highly limited for the construction stage.	No AEoSI
	Guillemot		Considering the species' moderate vulnerability to noise, lighting and visual disturbance, and the Project's commitment to minimise this using HDD for cable installation, the potential for adverse effects is highly limited for the construction stage.	No AEoSI
	Fulmar		Considering the species' low vulnerability to noise, lighting and visual disturbance, and the Project's commitment to minimise this using HDD for cable installation, the potential for adverse effects is highly limited for the construction stage.	No AEoSI
	Shag		Considering the species' moderate vulnerability to noise, lighting and visual disturbance, and the Project's commitment to minimise this using HDD for cable installation, the potential for adverse effects is highly limited for the construction stage.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
Operation				
Buchan Ness to Collieston Cost SPA	Seabird assemblage	The population of the qualifying features are viable components of the Buchan Ness to Collieston Coast SPA.	No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Guillemot		The potential for an AEoSI could not be ruled out when considering the upper limit of the guidance approach. This is due to PVA results predicting a reduction in growth rate of 0.48% per annum. Such a reduction in growth rate could not be ruled out as potentially effecting the long-term integrity of the feature.	AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited evidence suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
Troup, Pennan and Lion's Head SPA	Guillemot	The population of the qualifying features are viable components of the Troup, Pennan and Lion's Head SPA.	The potential for an AEoSI was confidently ruled out due to the predicted reduction in annual growth rate being sufficiently small as to be indistinguishable from natural fluctuations in the population.	No AEoSI
	Seabird assemblage		No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
	Razorbill		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
Fowlsheugh SPA	Kittiwake	The population of the qualifying features are viable components of the Fowlsheugh SPA.	The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Seabird assemblage		Potential for a LSE has been ruled out for named components of the seabird assemblage from the Project alone. Any potential effect on such a component is not considered likely to impact the conservation objectives of the seabird assemblage materially.	No AEoSI
	Razorbill		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
East Caithness Cliffs SPA	Kittiwake	The population of the qualifying features are viable components of the East Caithness Cliffs SPA.	The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Razorbill		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI

Designated site	**Qualifying feature(s)**	**Conservation objectives**	**Justification for AEoSI conclusion**	**AEoSI conclusion**
	Seabird assemblage		No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Great black-backed gull		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
North Caithness Cliffs SPA	Seabird assemblage	The population of the qualifying features are viable components of the North Caithness Cliffs SPA.	Potential for a LSE has ruled out for named components of the seabird assemblage from the Project alone. Any potential effect on such a component is not considered likely materially to impact the conservation objectives of the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Razorbill		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Puffin		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
Forth Islands SPA	Gannet	The population of the qualifying features are viable components of the Forth Islands SPA.	The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Puffin		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Seabird assemblage		Potential for a LSE has ruled out for named components of the seabird assemblage from the Project alone. Any potential effect on such a component is not considered likely to materially impact the conservation objectives of the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Razorbill		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
Copinsay SPA	Seabird assemblage	The population of the qualifying features are viable components of the Copinsay SPA.	No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Great black-backed gull		The predicted impact is less than 0.1 breeding adult per annum, which can confidently be concluded as an intangible effect.	No AEoSI
	Guillemot		The potential for an AEoSI was confidently ruled out due to the predicted reduction in annual growth rate being sufficiently small as to be indistinguishable from natural fluctuations in the population.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
Hoy SPA	Great skua	The population of the qualifying features are viable components of the Hoy SPA.	The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Seabird assemblage		Potential for a LSE has ruled out for named components of the seabird assemblage from the Project alone. Any potential effect on such a component is not considered likely materially to impact the conservation objectives of the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Great black-backed gull		The predicted impact is less than 0.1 breeding adults per annum, which can confidently be concluded as an intangible effect.	No AEoSI
	Puffin		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
Auskerry SPA	Storm petrel	The population of the qualifying features are viable components of the Auskerry SPA.	Species is considered to have low sensitivity to collision and distributional responses and was recorded in the OAA plus 4km buffer in low numbers.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
St Abb's Head to Fast Castle SPA	Seabird assemblage	The population of the qualifying features are viable components of the St Abb's Head to Fast Castle SPA.	No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Razorbill		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
Fair Isle SPA	Guillemot	The population of the qualifying features are viable components of the Fair Isle SPA.	The potential for an AEoSI was confidently ruled out due to the predicted reduction in annual growth rate being sufficiently small as to be indistinguishable from natural fluctuations in the population.	No AEoSI
	Seabird assemblage		No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Great skua		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Razorbill		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Puffin		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
	Gannet		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
Calf of Eday SPA	Seabird assemblage	The population of the qualifying features are viable components of the Calf of Eday SPA.	No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Great black-backed gull		The predicted impact is less than 0.1 breeding adult per annum, which can confidently be concluded as an intangible effect.	No AEoSI
	Guillemot		The potential for an AEoSI was confidently ruled out due to the predicted reduction in annual growth rate being sufficiently small as to be indistinguishable from natural fluctuations in the population.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
Rousay SPA	Seabird assemblage	The population of the qualifying features are viable components of the Rousay SPA.	No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
Marwick Head SPA	Seabird assemblage	The population of the qualifying features are viable components of the Marwick Head SPA.	Potential for a LSE has ruled out for named components of the seabird assemblage from the Project alone. Any potential effect on such a component is not considered likely to materially impact the conservation objectives of the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
West Westray SPA	Seabird assemblage	The population of the qualifying features are viable components of the West Westray SPA.	No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Kittiwake		The potential for an AEoSI was confidently ruled out due to the predicted reduction in annual growth rate being sufficiently small as to be indistinguishable from natural fluctuations in the population.	No AEoSI
	Razorbill		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
Farne Islands SPA	Seabird assemblage	The population of the qualifying features are viable components of the Farne Islands SPA.	No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Puffin		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
Cape Wrath SPA	Seabird assemblage	The population of the qualifying features are viable components of the Cape Wrath SPA.	No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
Sumburgh Head SPA	Seabird assemblage	The population of the qualifying features are viable components of the Sumburgh Head SPA.	No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
Handa SPA	Seabird assemblage	The population of the qualifying features are viable components of the Handa SPA.	No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Great skua		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
Sule Skerry and Sule Stack SPA	Puffin	The population of the qualifying features are viable components of the Sule Skerry and Sule Stack SPA.	The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Storm petrel		Species is considered to have low sensitivity to collision and distributional responses and was recorded in the OAA plus 4km buffer in low numbers. There is also no evidence that storm petrels are attracted to or adversely affected by the lighting levels typically used in offshore wind farms.	No AEoSI
	Leach's storm petrel		Species is considered to have low sensitivity to collision and distributional responses and was recorded in the OAA plus 4km buffer in low numbers. There is also no evidence that storm petrels are attracted to or adversely affected by the lighting levels typically used in offshore wind farms.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
	Gannet		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Seabird assemblage		No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
Mousa SPA	Storm petrel	The population of the qualifying features are viable components of the Mousa SPA.	Species is considered to have low sensitivity to collision and distributional responses and was recorded in the OAA plus 4km buffer in low numbers. There is also no evidence that storm petrels are attracted to or adversely affected by the lighting levels typically used in offshore wind farms.	No AEoSI
Noss SPA	Great skua	The population of the qualifying features are viable components of the Noss SPA.	The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Gannet		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Seabird assemblage		No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Puffin		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
Foula SPA	Great skua	The population of the qualifying features are viable components of the Foula SPA.	The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Puffin		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Leach's storm petrel		Species is considered to have low sensitivity to collision and distributional responses and was recorded in the OAA plus 4km buffer in low numbers. There is also no evidence that storm petrels are attracted to or adversely affected by the lighting levels typically used in offshore wind farms.	No AEoSI
	Seabird assemblage		No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Razorbill		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
Shiant Isles SPA	Seabird assemblage	The population of the qualifying features are viable components of the Shiant Isles SPA.	No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
North Rona and Sula Sgeir SPA	Storm petrel	The population of the qualifying features are viable components of the North Rona and Sula Sgeir SPA.	Species is considered to have low sensitivity to collision and distributional responses and was recorded in the OAA plus 4km buffer in low numbers. There is also no evidence that storm petrels are attracted to or adversely affected by the lighting levels typically used in offshore wind farms.	No AEoSI
	Leach's storm petrel		Species is considered to have low sensitivity to collision and distributional responses and was recorded in the OAA plus 4km buffer in low numbers. There is also no evidence that storm petrels are attracted to or adversely affected by the lighting levels typically used in offshore wind farms.	No AEoSI
	Seabird assemblage		No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
	Gannet		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
Fetlar SPA	Great skua	The population of the qualifying features are viable components of the Fetlar SPA.	The predicted impact is less than 0.1 breeding adults per annum, which can confidently be concluded as an intangible effect.	No AEoSI
	Seabird assemblage		No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
Hermaness, Saxa Vord and Valla Field SPA	Great skua	The population of the qualifying features are viable components of the Hermaness, Saxa Vord and Valla Field SPA.	The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Puffin		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Gannet		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Seabird assemblage		No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Kittiwake		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
			distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	
Flannan Isles SPA	Leach's storm petrel	The population of the qualifying features are viable components of the Flannan Isles SPA.	Species is considered to have low sensitivity to collision and distributional responses and was recorded in the OAA plus 4km buffer in low numbers. There is also no evidence that storm petrels are attracted to or adversely affected by the lighting levels typically used in offshore wind farms.	No AEoSI
	Seabird assemblage		No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
Flamborough and Filey Coast SPA	Kittiwake	The population of the qualifying features are viable components of the Flamborough and Filey Coast SPA.	The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Razorbill		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Gannet		The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Seabird assemblage		No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
	Guillemot		The potential for an AEoSI was confidently ruled out due to the predicted reduction in annual growth rate being sufficiently small as to be indistinguishable from natural fluctuations in the population.	No AEoSI
St Kilda SPA	Great skua	The population of the qualifying features are viable components of the St Kilda SPA.	The level of impact predicted annually from the Project alone does not exceed a 0.02% change in adult survival rate, which would be indistinguishable from natural fluctuations in the population.	No AEoSI
	Leach's storm petrel		Species is considered to have low sensitivity to collision and distributional responses and was recorded in the OAA plus 4km buffer in low numbers. There is also no evidence that storm petrels are attracted to or adversely affected by the lighting levels typically used in offshore wind farms.	No AEoSI
	Seabird assemblage		No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
	Manx shearwater		Species is considered to have low sensitivity to collision and distributional responses and was recorded in the OAA plus 4km buffer in very low numbers. There is also no evidence that shearwaters are attracted to or adversely affected by the lighting levels typically used in offshore wind farms.	No AEoSI

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
Mingulay and Berneray SPA	Seabird assemblage	The population of the qualifying features are viable components of the Mingulay and Berneray SPA.	No AEoSI ruled for all components of the seabird assemblage, therefore the same conclusion can be drawn for the seabird assemblage.	No AEoSI
	Fulmar		Considering the species' large foraging range and high habitat flexibility, plus limited research suggesting any impact from distributional responses, there is not considered any realistic pathway to effect for fulmar in the O&M stage.	No AEoSI
Decommissioning				
Buchan Ness to Collieston Cost SPA	Seabird assemblage	The population of the qualifying features are viable components of the Buchan Ness to Collieston Coast SPA.	The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage.	No AEoSI
	Kittiwake		The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage.	No AEoSI
	Herring gull		The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage.	No AEoSI
	Guillemot		The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage.	No AEoSI
	Fulmar		The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage.	No AEoSI
	Shag		The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage.	No AEoSI

6.3 Intertidal ornithology

6.3.1 Approach to assessment

6.3.1.1 This Section provides information to determine whether it is possible to exclude adverse effect from the Project on the qualifying features of designated sites (SPAs) screened into the AA. This Section in particular focuses on 'intertidal' ornithology, which refers to potential effects within the intertidal environment between MLWS and MHWS on ornithology features.

6.3.1.2 For each designated site, a site description is provided. Depending on the information available, this may include its conservation objectives, supplementary advice on the conservation objectives, conservation advice, site condition monitoring or other baseline resources.

6.3.1.3 At the point of screening, three proposed landfalls were considered by the Project; Scotstown, Lunderton and Sandford Bay. Post-screening, following further refinement by the Project the decision was made to discontinue Sandford Bay as a potential landfall option. As this location is no longer part of the Project any LSEs screened in relating to the Sandford Bay landfall no longer require assessment. Therefore, the intertidal ornithology assessment focuses on Scotstown and Lunderton landfalls only.

6.3.2 Buchan Ness to Collieston Coast SPA

Site description

6.3.2.1 As identified during screening, Buchan Ness to Collieston Coast SPA boundary overlaps with the offshore export cable corridor and is located approximately 8.31km from Scotstown and 4.62km from Lunderton landfall locations.

6.3.2.2 SPA site description is as follows (NatureScot, 2024): *"Buchan Ness to Collieston Coast SPA is a stretch of south-east facing cliff in Aberdeenshire, Scotland. The 15 km stretch of cliffs, formed of granite, quartzite and other rocks, runs south of Peterhead, broken only by the sandy beach of Cruden Bay. The varied coastal vegetation on the ledges and the cliff tops includes maritime heath, grassland and brackish flushes. The boundary of the SPA follows the boundaries of Bullers of Buchan Coast SSSI and Collieston to Whinnyfold Coast SSSI, and the seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface."*

Conservation objectives and condition assessment

6.3.2.3 The overarching conservation objectives for the SPA are listed below. Those relevant to assessment are highlighted bold, based on consideration of how the identified impact pathways may affect the qualifying features screened in for assessment:

- To ensure that the qualifying features of the Buchan Ness to Collieston Coast SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- To ensure that the integrity of the Buchan Ness to Collieston Coast SPA is restored in the context of environmental changes by meeting the following objectives for each feature:
  - the population of the qualifying features are viable components of the Buchan Ness to Collieston Coast SPA;

- the distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species; and
- the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at Buchan Ness to Collieston Coast SPA.

6.3.2.4 The latest condition assessment for the guillemot feature of Buchan Ness to Collieston Coast SPA was completed by NatureScot in 2024. The guillemot feature was classified to be in a favourable condition suggesting that the conservation objective in relation to population size have been maintained.

6.3.2.5 The latest condition assessment for the shag feature of Buchan Ness to Collieston Coast SPA was completed by NatureScot in 2024. The shag feature was classified to be in an unfavourable condition suggesting that the conservation objective in relation to population size is currently in recovery.

Qualifying features requiring assessment

6.3.2.6 The qualifying features of Buchan Ness to Collieston Coast SPA where the potential for a LSE was concluded for identified effect pathways, seasons and Project stages is as follows:

- Guillemot:
  - direct temporary disturbance and displacement at the Scotstown landfall during construction and decommissioning (breeding and non-breeding season).
- Shag:
  - direct temporary disturbance and displacement at the Scotstown landfall during construction and decommissioning (breeding and non-breeding season).

Assessment of potential effects from the Project alone

Guillemot

Direct temporary disturbance and displacement during construction and decommissioning stages (offshore export cable corridor and landfall)

6.3.2.7 Guillemot is considered moderately sensitive to vessel disturbance due to their limited habitat flexibility and specialist foraging behaviours (Furness *et al.* 2013). However, their sensitivity is largely context dependant (e.g., vessel size, speed, noise). Fliessbach *et al.* (2019) calculated a traffic DVI for Northwest European seabirds, calculating the risk of disturbance for a range of seabird species in the German North and Baltic Seas. For guillemot, responses were variable, with 17% of guillemot recorded flying away from a vessels, and 20% escape diving (n=929). Mean escape distances for these species were 127m (+/- 113m).

6.3.2.8 During the 12 months of intertidal surveys at Scotstown, guillemot were recorded in eight surveys but with only one peak count exceeding the 1% threshold of the Buchan Ness to Collieston Coast SPA citation population, recorded in August 2023. This peak count would suggest a post-breeding aggregation which would be expected to disperse offshore in later months as guillemots move to their wintering grounds offshore and therefore does not represent consistent use of the site by large numbers of guillemots.

6.3.2.9 Construction and decommissioning activities at the Scotstown landfall location are expected to be highly localised and temporary in nature, focussed on vessels in operation, with guillemot having the opportunity to return to the area when activities have ceased. Further to this, the Projects commitment to use HDD for cable installation (see **Appendix B**; M-056) will significantly reduce the overall activity at the landfall, mitigating any potential for impacts to guillemot.

6.3.2.10 Despite guillemot's moderate vulnerability, when considering the usage of the site by the species and the intensity of the potential impact (taking into account the Projects commitment to HDD), the potential for adverse effects to the guillemot qualifying feature of Buchan Ness to Collieston Coast SPA are highly limited for the construction stage. The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage and so the same conclusion applies for the decommissioning stage. **Therefore, the potential for an AEoSI in relation to direct temporary disturbance and displacement effects during the construction and decommissioning stages can be confidently ruled out for the Project alone.**

Shag

Direct temporary disturbance and displacement during construction and decommissioning stages (offshore export cable corridor and landfall)

6.3.2.11 Overall information on shag vulnerability to anthropogenic disturbance is limited, however, available evidence from Garthe and Hüppop (2004) classifies the species as highly sensitive to ship and helicopter traffic, and Velando and Munilla (2011) observed avoidance behaviour in response to vessel presence. However, shags are frequently seen using man-made structures such as piers and harbour walls for loafing and wing-drying, often in areas with regular human activity. This suggests that local habituation may occur, potentially reducing their sensitivity to disturbance in some contexts.

6.3.2.12 Shag were recorded in all 12 months of intertidal surveys at Scotstown, and present in large number throughout the survey programme with all but one peak count recorded exceeding the 1% threshold of the Buchan Ness to Collieston Coast SPA citation population. The highest peak count of 820 individuals (recorded in August 2023) represents 39.2% of the Buchan Ness to Collieston Coast SPA citation population. Within Scotstown, shag were distributed widely in nearshore areas but with limited use of the intertidal, confined only to the intertidal rocks in the south. This is within the survey area buffer but approximately 300m outside of the landfall area of search suggesting activities at the landfall have limited potential to impact the species.

6.3.2.13 Construction and decommissioning activities at Scotstown landfall location are expected to be highly localised and temporary in nature, focussed on vehicles or vessels in operation, with shag having the opportunity to return to the area when activities have ceased. Further to this, the Projects commitment to use HDD for cable installation (see **Appendix B**; M-056) will significantly reduce the overall activity at the landfall, mitigating any potential for impact to shag. As shag are generalist piscivores with a broad prey base of demersal, benthic and pelagic fish species, they are not associated with specific benthic habitats and so have the ability to move to adjacent suitable foraging habitat should a temporary disturbance impact occur. Therefore, any short-term localised disturbance or displacement is not considered to result in a significant impact to the species.

6.3.2.14 Despite shag's possible vulnerability, when considering the intensity of the potential impact (taking into account the Projects commitment to HDD), the potential for adverse effects to the shag qualifying features of Buchan Ness to Collieston Coast SPA are limited for the construction stage. The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage and so the same conclusion applies for the decommissioning stage. **Therefore, the**

potential for an AEoSI in relation to direct temporary disturbance and displacement effects during the construction and decommissioning stages can be confidently ruled out for the Project alone.

6.3.3 Ythan Estuary, Sands of Forvie and Meikle Loch SPA

Site description

6.3.3.1 As identified at screening stage the Ythan Estuary, Sands of Forvie and Meikle Loch SPA is located approximately 16.32km from Scotstown and 12.70km from Lunderton. Given the distance from the SPA, the Project does not directly overlap with the SPA boundary or any known functionally linked areas.

6.3.3.2 SPA site description is as follows (NatureScot, 2024): *"Ythan Estuary, Sands of Forvie and Meikle Loch SPA covers a complex area in the north east of Scotland that contains the long, narrow estuary of the River Ythan, the Sands of Forvie on the east bank of the estuary; the eutrophic Meikle Loch and a marine component covering the area between Aberdeen and Cruden Bay to the north. The boundaries of the SPA follow those of Sands of Forvie and Ythan Estuary SSSI and the shore of Meikle Loch and Little Loch within Meikle Loch and Kippet Hills SSSI."*

Conservation objectives and condition assessment

6.3.3.3 The overarching conservation objectives for the SPA are listed below. Those relevant to assessment are highlighted bold, based on consideration of how the identified impact pathways may affect the qualifying features screened in for assessment:

- To ensure that the qualifying features of the Ythan Estuary, Sands of Forvie and Meikle Loch SPA are in favourable condition and make an appropriate contribution to achieving FCS.
- To ensure that the integrity of the Ythan Estuary, Sands of Forvie and Meikle Loch SPA is restored in the context of environmental changes by meeting the following objectives for each feature:
  - the population of the qualifying features are viable components of the Ythan Estuary, Sands of Forvie and Meikle Loch SPA;
  - the distribution of the qualifying features throughout the site are maintained, or where appropriate restored, by avoiding significant disturbance of the species; and
  - the supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at Ythan Estuary, Sands of Forvie and Meikle Loch SPA.

6.3.3.4 The latest condition assessment for the eider feature of Ythan Estuary, Sands of Forvie and Meikle Loch SPA was completed by NatureScot in 2024. The eider feature was classified as unfavourable condition, therefore suggesting that conservation objectives are targeted at ensuring the population has the ability to recover.

Qualifying features requiring assessment

6.3.3.5 The qualifying feature of Ythan Estuary, Sands of Forvie and Meikle Loch SPA where the potential for a LSE was concluded for identified effect pathways, seasons, Project stages and landfall site is as follows:

- Eider
  - Direct temporary disturbance and displacement at the Scotstown landfall during construction and decommissioning (breeding and non-breeding season).

Assessment of potential effects from the Project alone

Eider

6.3.3.6 Eider are considered to have medium to high vulnerability to anthropogenic disturbance. Available evidence suggests eiders are able to tolerate high levels of human disturbance; for example, in Scotland, females have been recorded allowing pedestrians within 1-2m before flushing (Goodship and Furness, 2022). However, evidence also suggests moderate vulnerability to vessels, with boat disturbance shown both to disturb birds and reduce foraging activity (Denhard *et al.* 2020; Merkel *et al.* 2009). Disturbance vulnerability is therefore considered to be medium.

6.3.3.7 Eider were recorded in all 12 months of intertidal surveys at Lunderton, and present in moderate to high numbers throughout the survey programme. Peak counts recorded in five months exceeded the 1% threshold of the Ythan Estuary, Sands of Forvie and Meikle Loch SPA citation population. The highest peak count of 100 individuals (recorded in January 2023) represents approximately 5.4% of the Ythan Estuary, Sands of Forvie and Meikle Loch SPA citation population. At Lunderton, eider was distributed predominately offshore within the survey area buffer with highly limited use of the intertidal, confined to small numbers only using the intertidal rocks in the south. This is approximately 300m outside of the landfall area of search suggesting activities at the landfall have limited potential to impact the species.

6.3.3.8 Construction and decommissioning activities at the Lunderton landfall location are expected to be highly localised and temporary in nature, focussed on vessels in operation, with eider having the opportunity to return to the area when activities have ceased. Further to this, the Projects commitment to use HDD for cable installation (see **Appendix B**; M-056) will reduce the overall activity at the landfall, mitigating any potential for impacts to eider. Therefore, any short-term localised disturbance is not considered to result in a significant impact to the species.

6.3.3.9 Despite eider's medium vulnerability, when considering the intensity of the potential impact (taking into account the Projects commitment to HDD), the potential for adverse effects to the eider qualifying feature of Ythan Estuary, Sands of Forvie and Meikle Loch SPA are limited for the construction stage. The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage and so the same conclusion applies for the decommissioning stage. **Therefore, the potential for an AEoSI in relation to direct temporary disturbance and displacement effects during the construction and decommissioning stages can be confidently ruled out for the Project alone.**

6.3.4 Summary of intertidal ornithology alone impacts

6.3.4.1 A summary of the conclusions drawn for all offshore ornithology qualifying features of designated sites assessed is provided in **Table 6.130**.

Table 6.130 Summary of AEoSIs for intertidal ornithology

Designated site	Qualifying feature(s)	Conservation objectives	Justification for AEoSI conclusion	AEoSI conclusion
Construction and decommissioning stages				
Buchan Ness to Collieston Coast SPA	Guillemot	The population of the qualifying features are viable components of the Buchan Ness to Collieston Coast SPA.	Short term and spatially limited effect pathway combined with commitment to HDD (see **Appendix B**; M-056), minimising work required within the intertidal zone.	No AEoSI
	Shag		Short term and spatially limited effect pathway combined with commitment to HDD (see **Appendix B**; M-056), minimising work required within the intertidal zone.	No AEoSI
Ythan Estuary, Sands of Forvie and Meikle Loch SPA	Eider	The population of the qualifying features are viable components of the Ythan Estuary, Sands of Forvie and Meikle Loch SPA.	Short term and spatially limited effect pathway combined with commitment to HDD (see **Appendix B**; M-056), minimising work required within the intertidal zone.	No AEoSI

6.4 Terrestrial ecology and ornithology

6.4.1 Loch of Strathbeg SPA / Ramsar

6.4.1.1 This Section assesses whether the Project alone would result in AEoSI of the Loch of Strathbeg SPA / Ramsar, with specific reference to the pink-footed goose qualifying feature. The assessment is structured by Project stage and impact pathway and is informed by the COs, population context, and embedded environmental measures.

6.4.1.2 The Loch of Strathbeg is the main roost for pink-footed geese in Aberdeenshire; however previous goose distribution surveys (Patterson and Thorpe, 2006 and Littlewood and Sidaris, 2016) have demonstrated that this species forages widely within the surrounding agricultural landscape. Most pink-footed geese in North-East Scotland forage within 20 km of their roost site (Patterson, 2013). Littlewood and Sidaris (2016) found that similar to previous studies in 2004 (Patterson and Thorpe, 2006), the most heavily used areas by foraging geese comprised the fields within 3km to the north and south of the Loch of Strathbeg.

6.4.1.3 The long-term maintenance of the SPA population of pink-footed geese is therefore intrinsically linked to the availability of foraging habitats outwith the SPA / Ramsar boundary. As such, potential impacts on functionally linked areas within a potential ZOI of the Onshore Red Line Boundary are relevant to this assessment. Furthermore, activities that can affect pink-footed geese both within and outwith the designated site are also considered if they could impair the ability of the population to remain viable. Therefore, whilst the Project itself does not overlap with the SPA / Ramsar boundary, potential impacts on functionally linked areas have been considered.

Conservation objectives

6.4.1.4 The assessment is undertaken with respect to the COs for the pink-footed goose qualifying feature of the Loch of Strathbeg SPA (NatureScot, 2025c). The COs for the site are:

- ***"CO 1:** To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and*
- ***CO 2:** To ensure for the qualifying species that the following are maintained in the long term:*
  - *population of the species as a viable component of the site;*
  - *distribution of the species within the site;*
  - *distribution and extent of habitats supporting the species;*
  - *structure, function and supporting processes of habitats supporting the species;*
  - *no significant disturbance of the species."*

6.4.2 Construction and decommissioning stage

6.4.2.1 This assessment considers the nature and scale of the construction impacts, as presented in **Section 5.4.3**. The nature and scale of decommissioning activities are anticipated to be comparable to, or less than, those of the construction stage. Therefore, potential effects on the pink-footed goose qualifying feature of the Loch of Strathbeg SPA / Ramsar from the decommissioning stage are assessed on the same basis as the construction stage.

6.4.2.2 The following sections assess each relevant impact pathway to determine whether construction and decommissioning stages of the Project alone could lead to an AEoSI on the pink-footed goose qualifying feature of the Loch of Strathbeg SPA / Ramsar, with respect to the COs.

Land take / land cover change

6.4.2.3 This Section assesses the potential for the Project, alone, to result in the loss of functionally-linked foraging habitat utilised by pink-footed geese associated with the Loch of Strathbeg SPA / Ramsar during construction and decommissioning. The assessment is undertaken with reference to conservation objectives **CO 1** and **CO 2** noted in **Section 6.4.1**.

6.4.2.4 Pink-footed geese were recorded regularly over winter foraging in agricultural fields east of St Fergus within the Onshore Red Line Boundary and within a potential ZOI of the Scotstown landfall. These fields are considered to be functionally linked with the Loch of Strathbeg SPA / Ramsar. Pink-footed geese were not recorded utilising agricultural land at Lunderton North landfall and Lunderton South landfall and the nearest foraging habitat is outside a potential ZOI of the proposed works at these locations.

6.4.2.5 The Scotstown landfall will result in approximately 80m of temporary access track connecting an existing track with the landfall(s) temporary construction compound. There will be no permanent land cover change.

6.4.2.6 No pink-footed geese were recorded foraging in this location, with most records from two large fields to the north of the existing track (with the nearest approximately 200m to the north).

6.4.2.7 Temporary land use during the construction stage could result in the temporary loss of a small proportion of available functionally linked habitat at the Scotstown landfall within the Onshore Red Line Boundary approximately 5.5km to the south of the SPA / Ramsar over a single winter season. Pink-footed geese utilise an extensive area of farmland within a core range within 15 km from the Loch of Strathbeg. The results of the 2022 / 2023 surveys demonstrated that pink-footed goose flocks made heavy regular use of the area within 3km of the Loch of Strathbeg, corresponding to the results presented in Littlewood and Sidaris (2016) and Patterson and Thorpe (2006). Therefore, due to the avoidance of core foraging fields within 3km of the Loch of Strathbeg and given the extent of available habitat functionally linked within the SPA that would remain undisturbed during construction and decommissioning, availability of foraging habitat for this species is not considered to be a limiting factor.

6.4.2.8 The Project's embedded environmental measures (as shown in Table 23.8 of **Volume 1, Chapter 23: Terrestrial Ecology and Ornithology** of the **EIA Report**) include the sensitive placement of HDD / other trenchless crossing entry / exit pits outside the designated sites and minimises the impact to functionally-linked land (M-002). Furthermore, all areas of temporary habitat loss will be reinstated wherever practicable (M-009) alongside an adherence to the Outline CEMP (M-063) to minimise land take of functionally-linked habitat.

6.4.2.9 It is therefore concluded that the Project alone will not result in any AEoSI in relation to land take / land cover change during construction activities, and that, subject to natural change, the population of pink-footed geese will be maintained in the long-term.

Increased human presence, noise and vibration during construction

6.4.2.10 This Section assesses the potential for the Project, alone, to result in behavioural disturbance and displacement to pink-footed geese associated with the Loch of Strathbeg SPA / Ramsar during construction and decommissioning. The assessment is undertaken with reference to site conservation objectives **CO 1** and **CO 2** noted in **Section 6.4.1**.

6.4.2.11 For the purposes of this assessment, significant disturbance is defined in line with NatureScot (2025cb) guidance as any impact that results in more than a transient effect on the distribution of pink-footed geese. Such disturbance may be the result of impact likely to adversely affect the conservation status of the species, by:

- preventing a recovering or reintroduced species from reaching FCS, at a national or international level; or
- changing a species' status from favourable to unfavourable; or
- for a species that is already in decline, whether the proposal would undermine the potential for halting its decline and allowing it to recover to FCS.

6.4.2.12 Pink-footed geese were recorded foraging over winter within agricultural fields considered to be functionally linked with the Loch of Strathbeg SPA located to the east of St Fergus. These fields lie within a 500m ZOI of the Onshore Red Line Boundary with respect to Scotstown landfall only. Neither the Lunderton North or South landfalls were found to support wintering pink-footed geese and therefore these landfalls will enable spatial avoidance of those agricultural fields where this species was recorded.

6.4.2.13 Construction works for the Scotstown landfall location may result in potential impact pathways in terms of disturbance effects resulting in temporary displacement / loss of functionally linked habitat during the construction stage.

6.4.2.14 Wintering pink-footed geese can be susceptible to disturbance from human activity and will react to dog walkers and vehicles, although they are often found foraging close to roads as they become habituated to vehicular activity. Pink-footed geese associated with the Loch of Strathbeg SPA were recorded foraging with greatest regularity (but most pronounced between December and February), on agricultural fields within 3km of the Loch of Strathbeg, which are 3km from the Onshore Red Line Boundary and at this distance, disturbance is unlikely.

6.4.2.15 Pink-footed geese have been shown to range extensively across a wide area (**Volume 3, Appendix 23.6** and **Appendix 23.7** of the **EIA Report**), extending up to approximately 15 km from the Loch of Strathbeg, where they have been recorded utilising agricultural fields within a wider 130km^2. Consequently, due to the availability of extensive foraging habitat (comprising improved pasture and arable fields) for pink-footed geese outside the ZOI, should individuals utilising fields within the ZOI be disturbed by onshore construction activities associated with the Scotstown landfall, their potential relocation to known areas of use or reduced foraging activity is unlikely to have a discernible effect on energetics. As such, a significant effect on pink-footed geese is unlikely.

6.4.2.16 Therefore, the magnitude of the impact that construction activities relating to the Project (at Scotstown landfall) will have on the wintering populations of pink-footed geese of international importance is considered to be low, indicating that there is potential for limited temporary disturbance or displacement that does not threaten the long-term viability of the Loch of Strathbeg SPA / Ramsar populations.

6.4.2.17 The Project embedded environmental measures (Table 23.8, **Volume 1, Chapter 23: Terrestrial Ecology and Ornithology** of the **EIA Report**) include a Bird Protection Plan (BPP), which will ensure avoidance and / or minimisation of disturbance impacts to pink-footed geese during sensitive winter periods (M-135), pre-construction surveys (M-134) and presence of an Environmental Clerk of Works (M-133), alongside an adherence to Outline CEMP (M-063), to ensure localised disturbance effects are limited. Additional relevant commitments include a sensitive temporary lighting installation (M-011) and reduction of working width of corridor close to sensitive features (M-027).

6.4.2.18 Considering the widespread availability of suitable habitat, the temporary nature of works over the winter period (if Scotstown landfall is required) and the aforementioned embedded environmental measures, it can be determined that there will be no AEoSI on SPA / Ramsar pink-footed goose populations (in relation to Project alone disturbance / displacement).

6.4.3 Operation and maintenance stage

6.4.3.1 The following Section assesses each relevant impact pathway to determine whether the O&M stage of the Project, in isolation, could compromise the achievement of the COs for pink-footed goose associated with the Loch of Strathbeg SPA / Ramsar.

Operation and maintenance disturbance

6.4.3.2 This Section assesses the potential for the Project, alone, to result in behavioural disturbance to pink-footed geese associated with the Loch of Strathbeg SPA / Ramsar during the O&M stage. The assessment is undertaken with reference to the site conservation objectives CO 1 and CO 2 noted in **Section 6.4.1**.

6.4.3.3 No operational activities will be undertaken within the landfall(s) (specifically the Scotstown landfall). However, occasional maintenance may comprise ad-hoc visits, including activities for inspection / maintenance purposes. Unscheduled maintenance or emergency repair visits may involve the presence of light vehicles, that would likely gain access using existing field and site accesses. Infrequently, sections of cable may need to be replaced and, depending on the nature of the maintenance required, the use of an occasional heavy goods vehicle may be utilised. Subject to location, cable replacement may involve creating a temporary access using trackway or another temporary access road type, excavating to confirm the cable fault location using excavation equipment and excavating the required length of cable to enable repair / replacement.

6.4.3.4 O&M works activities will be relatively low frequency in occurrence, generally localised in scale, and involve low noise generation. Where more intrusive works are required within a ZOI of potentially sensitive areas for pink-footed geese, impact avoidance and mitigation measures will be implemented.

6.4.3.5 It is therefore considered that no new risks are anticipated when compared to the assessment of the construction and decommissioning stage. Therefore, the assessment conclusion for this pathway from the construction and decommissioning stage is also applicable to the O&M stage, with respect to CO1 and CO2.

6.4.3.6 The Project embedded environmental measures (as presented in Table 23.8 of **Volume 1, Chapter 23: Terrestrial Ecology and Ornithology** of the **EIA Report**) include the provision that permanent rights or servitude for the onshore export cable corridor will be kept to the minimum width needed for safe access for cable maintenance or replacement purposes during operation of the Project (M-066), which will ensure that any disturbance impacts are minimised during operation.

6.4.3.7 It is therefore concluded that the Project alone will not result in any AEoSI in relation to disturbance during O&M activities, and that, subject to natural change, the population of pink-footed geese will be maintained in the long-term.

6.4.4 Alone assessment summary for terrestrial ecology and ornithology

6.4.4.1 This Section summarises the assessment of potential impacts from the Project alone on the pink-footed goose qualifying feature of the Loch of Strathbeg SPA / Ramsar (**Table 6.131**). The assessment considers each relevant impact pathway identified during screening (see **Section 5.4.2**) and evaluates the potential for AEoSI with reference to the site conservation objectives CO 1 and CO 2 noted in **Section 6.4.1**.

Table 6.131 Summary of AEoSIs for onshore ecology and ornithology (alone)

Designated site	Qualifying feature(s)	Impact pathway	COs	Justification for AEoSI conclusion	AEoSI conclusion
Construction and Decommissioning					
Loch of Strathbeg SPA / Ramsar	Pink-footed goose	Land take / land cover change.	**CO1:** To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained.	Given the limited extent of land take and temporary nature of the habitat loss over winter period during the construction and decommissioning stages of the Project, the wide extent of known foraging habitat outside the ZOI within the surrounding area and the embedded environmental measures outlined, the temporary loss of habitat used by pink-footed geese within the Onshore Red Line Boundary will not affect the integrity of the Loch of Strathbeg SPA / Ramsar.	No AEoSI
			CO 2: To ensure for the qualifying species that the following are maintained in the long term: - population of the species as a viable component of the site; - distribution of the species within site; - distribution and extent of habitats supporting the species; - structure, function and supporting processes of habitats supporting the species; and - no significant disturbance of the species.	Baseline surveys have demonstrated a widespread distribution of pink-footed geese around the Loch of Strathbeg and extensive availability of agricultural land providing a suitable foraging resource within the wider landscape. The patterns of agricultural land use are unlikely to alter over the longer term and therefore the structure, function and supporting processes of this functionally linked foraging habitat will be maintained. Consequently, based on the limited extent of land take and temporary nature of the habitat loss during construction and decommissioning stages and the implementation of embedded environmental measures, the Loch of Strathbeg SPA / Ramsar pink-footed geese population will be maintained over the long term, and the population will	

Designated site	Qualifying feature(s)	Impact pathway	COs	Justification for AEoSI conclusion	AEoSI conclusion
				continue to form a viable component of the SPA / Ramsar'.	
		Increased human presence, noise and vibration during construction.	**CO1:** To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained.	A BPP is embedded to ensure disturbance effects to pink-footed geese at the Scotstown Landfall are adequately mitigated over winter periods during construction and decommissioning. In addition, given the wide extent of available foraging habitat within the surrounding area, significant disturbance effects will be avoided and the integrity of the Loch of Strathbeg SPA / Ramsar will be maintained.	No AEoSI
			CO 2: To ensure for the qualifying species that the following are maintained in the long term: - population of the species as a viable component of the site; - distribution of the species within site; - distribution and extent of habitats supporting the species; - structure, function and supporting processes of habitats supporting the species; and - no significant disturbance of the species.	Baseline surveys have demonstrated a widespread distribution of pink-footed geese around the Loch of Strathbeg and extensive availability of agricultural land providing a suitable foraging resource within the wider landscape. The patterns of agricultural land use are unlikely to alter over the longer term and therefore the structure, function and supporting processes of this functionally linked foraging habitat will be maintained. Given the localised and temporary nature of the works during construction and decommissioning and the embedded environmental measures outlined, which include a BPP, the population will continue to be a viable component of the SPA / Ramsar. Based on the rationale and measures described, there will be no significant disturbance to pink-footed geese and the SPA / Ramsar population will be maintained over the long term.	

Designated site	Qualifying feature(s)	Impact pathway	COs	Justification for AEoSI conclusion	AEoSI conclusion
O&M					
Loch of Strathbeg SPA / Ramsar	Pink-footed goose	O&M Disturbance.	**CO1:** To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained.	O&M works activities will be relatively low frequency in occurrence, involving ad hoc visits or activities, generally localised in scale, and low noise generation. Works will be unlikely to result in any greater impact than the construction and decommissioning stages and therefore deterioration of habitats and significant disturbance would be avoided. As such, the integrity of the Loch of Strathbeg SPA / Ramsar site would be maintained.	No AEoSI
			CO 2: To ensure for the qualifying species that the following are maintained in the long term: - population of the species as a viable component of the site; - distribution of the species within site; - distribution and extent of habitats supporting the species; - structure, function and supporting processes of habitats supporting the species; and - no significant disturbance of the species;	The Loch of Strathbeg SPA / Ramsar Pink-footed geese population will be maintained over the long term, and given the localised and temporary nature of the works (of a more limited scale to that identified for the construction and decommissioning stages), the population will continue to be a viable component of the Site; Based on the rationale and measures described above, there will be no significant disturbance to the SPA / Ramsar population.	No AEoSI

7. Assessment of Adverse Effects on Site Integrity In-Combination

7.1 Background

7.1.1.1 In assessing the potential in-combination impacts of the Project against ecological receptors, account is taken in the assessment process of the fact that some projects, such as those put forward by developers into the consenting process, may not be consented or built out as described within their consent application. There is, therefore, a need to build in some consideration of certainty (or uncertainty) with respect to the potential impacts which might arise from such proposed but as yet unconsented projects. For example, a comparison with regards to certainty of effects can be made between those projects that are under construction and those proposals not yet approved where there is, in this second example, much less certainty about the scale of an impact. This is because some proposals may not achieve approval, may be built out at a scale less than the maximum described in the Scoping Report or **EIA Report**, or may not be built at all due to other factors.

7.1.1.2 To account for this in the in-combination assessments, all projects considered alongside the Project will be allocated into 'tiers' and 'sub-tiers' reflecting their current stage within the planning and development process (see **Table 7.1** and **Table 7.2**). This allows the in-combination impact assessment to present several future development scenarios, each with a differing potential for being ultimately built out. This approach also allows appropriate weight to be given to each scenario (tier) when considering the potential in-combination impact. The proposed tier structure is intended to ensure that there is a clear understanding of the level of confidence in the in-combination assessment for the Project's AA.

Table 7.1 Description of tiers and sub-tiers which will be considered in the in-combination assessments

Tier	Sub-Tier	Description of stage of development of project
Tier 1	Tier 1a	Developments in operation.
	Tier 1b	Developments under construction.
	Tier 1c	Permitted applications, whether under the Electricity Act 1989; Marine and Coastal Access Act 2009 (between 12 and 200nm) and the Marine (Scotland) Act 2010 (between 0 and 12nm); Town and Country Planning (Scotland) Act 1997; or other regimes but not yet implemented.
	Tier 1d	Submitted applications, whether under the Electricity Act 1989; Marine and Coastal Access Act 2009 (between 12 and 200nm) and the Marine (Scotland) Act 2010 (between 0 and 12nm); Town and Country Planning (Scotland) Act 1997; or other regimes but not yet determined.
Tier 2	N/A	Other developments where a Scoping Report has been submitted.
Tier 3	Tier 3a	Other developments where a Scoping Report has not been submitted.

Tier	Sub-Tier	Description of stage of development of project
	Tier 3b	Other developments identified in the relevant Development Plan (and emerging Development Plans with appropriate weight being given as they move closer to adoption) recognising that much information on any relevant proposals will be limited.
	Tier 3c	Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

7.1.1.3 Based on work done to date to determine which projects may be relevant, a number of projects have been identified (see **Table 7.2**). This presents Tier 1 projects only at this stage as the status of proposals within Tiers 2 and 3 are subject to change. It is not a definitive list and will be reviewed during the RIAA.

Table 7.2 Tier 1 projects to be considered in the in-combination assessment

Projects	
Tier 1a	
2B Energy Methil Demonstration **Aberdeen Offshore Wind Farm** **Beatrice Offshore Wind Farm** **Blyth Demo Phase 1** **Dogger Bank A Offshore Wind Farm** **Dudgeon Offshore Wind Farm** **East Anglia ONE Offshore Wind Farm** **Galloper Offshore Wind Farm** **Greater Gabard Offshore Wind Farm** **Gunfleet Sands Offshore Wind Farm** **Hornsea Project ONE Offshore Wind Farm** **Hornsea Project TWO Offshore Wind Farm** **Humber Gateway Offshore Wind Farm** **Hywind Scotland Pilot Park** **Kentish Flats Offshore Wind Farm** **Kincardine Offshore Wind Farm** **Lincs Offshore Wind Farm** **London Array Offshore Wind Farm** **Lynn and Inner Dowsing Offshore Wind Farm** **Moray East Offshore Wind Farm** **Race Bank Offshore Wind Farm** **Seagreen Offshore Wind Farm** **Sheringham Shoal Offshore Wind Farm** **Teeside Offshore Wind Farm** **Triton Knoll Offshore Wind Farm** **Westermost Rough Offshore Wind Farm** **Hywind Tampen Offshore Wind Farm** **TetraSpar Demonstrator** **UNITECH Zefyros Offshore Wind Farm** **EMEC Orbital O2 Tidal** **EMEC Billia Croo Wave** **EMEC Fall of Warness Tidal** **EMEC Scapa Flow Wave** **EMEC Shapinsay Sound**	GRANE Oil and gas VOLUND Oil and gas GINA KROG FSO Oil and gas JOHAN SVERDRUP E Oil and gas 25/11-D-2 H BALDER Oil and gas DRAUPNER S Oil and gas 25/11-A-23 H BALDER Oil and gas 25/11-C-13 H BALDER Oil and gas SLEIPNER D Oil and gas 25/11-E-29 H BALDER Oil and gas ANDREW Oil and gas BERYL A RISER Oil and gas ANASURIA Oil and gas FORTIES BRAVO Oil and gas KITTIWAKE Oil and gas FORTIES DELTA Oil and gas AEGIR WAVERIDER BUOY WEST ST NINIAN KFB21/2012 AREA1 Oil and gas PIERCE WAVERIDER Oil and gas CATS RISER Oil and gas NELSON A Oil and gas BERYL A Oil and gas MARINER B FSU Oil and gas MUNGO Oil and gas BERYL B Oil and gas SCOTT JD Oil and gas CULZEAN LIVING QTRS AND UTILITY (ULQ) Oil and gas CRUDEN BAY TANKS Oil and gas GOLDEN EAGLE WELLHEAD PLATFORM Oil and gas ST FERGUS GAS TERMINAL Oil and gas FRANKLIN WHP Oil and gas CULZEAN FSO – AILSA Oil and gas

Projects	
Meygen Pentland Firth Phase 1a **Shetland Tidal Array** **25/11-A-21 H BALDER Oil and gas** **25/11-B-7 J BALDER Oil and gas** **25/11-C-12 H BALDER Oil and gas** **24/9-P-8 KOBRA Oil and gas** **JOHAN SVERDRUP RP Oil and gas** **24/9-P-9 H Oil and gas** **25/11-A-19 H BALDER Oil and gas** **24/9-P-7 VIPER Oil and gas** **BALDER SDU A Oil and gas** **16/4 SOLVEIG BA Oil and gas** **SLEIPNER A Oil and gas** **SLEIPNER T Oil and gas** **25/11-D-1 H BALDER Oil and gas** **25/11-A-4 H BALDER Oil and gas** **25/11-D-25 H BALDER Oil and gas** **25/11-B-28 H BALDER Oil and gas** **25/11-D-10 H BALDER Oil and gas** **16/4 SOLVEIG BC Oil and gas** **GINA KROG T Oil and gas** **25/11-B-18 H BALDER Oil and gas** **EDVARD GRIEG Oil and gas** **25/11-D-26 H BALDER Oil and gas** **JOHAN SVERDRUP DP Oil and gas** **JOHAN SVERDRUP D Oil and gas** **SLEIPNER B Oil and gas** **BALDER SDU D Oil and gas** **25/11-A-22 H BALDER Oil and gas** **25/11-C-3 H BALDER Oil and gas** **16/4 SOLVEIG BB Oil and gas** **FROSK TEST PRODUCER Oil and gas** **IVAR AASEN Oil and gas** **UTGARD Oil and gas** **24/9-P-10 H Oil and gas** **24/9-P-6 AH Volund Oil and gas** **GRANE SSIV Oil and gas** **BØYLA Oil and gas** **VESTERLED T Oil and gas** **JOHAN SVERDRUP G Oil and gas** **GUDRUN Oil and gas** **SLEIPNER FL Oil and gas** **BALDER FPU Oil and gas** **JOHAN SVERDRUP LQ Oil and gas** **SVALIN C Oil and gas** **25/11-A-27 H BALDER Oil and gas** **25/11-B-11 H BALDER Oil and gas** **DRAUPNER E Oil and gas** **15/9-E Oil and gas** **16/4 SOLVEIG BD Oil and gas** **SLEIPNER C Oil and gas** **BALDER SDU B Oil and gas** **SIGYN Oil and gas** **25/11-A-6 H BALDER** **GINA KROG Oil and gas** **JOHAN SVERDRUP F Oil and gas** **25/11-A-5 H BALDER Oil and gas**	GRYPHON ALPHA Oil and gas BRAE EAST Oil and gas FORTIES ECHO Oil and gas MONTROSE A Oil and gas HARDING Oil and gas CLAYMORE CPP Oil and gas SHEARWATER C Oil and gas MARINER PDQ JACKET Oil and gas ETAP PDR Oil and gas BRITANNIA BLP Oil and gas ARMADA Oil and gas CAPTAIN Oil and gas CARDINAL BUOY 2 Oil and gas TRITON Oil and gas NORTH EVEREST Oil and gas FPSO GLOBAL PRODUCER III Oil and gas SHEARWATER A Oil and gas TIFFANY Oil and gas CLAYMORE CAP Oil and gas PIPER B Oil and gas BERYL SPM-2 Oil and gas BERYL SPM-3 Oil and gas ROSS Oil and gas HARDING OLS BUOY Oil and gas CAPTAIN WPPA Oil and gas ELGIN PUQ Oil and gas CAPTAIN BLPA Oil and gas ELGIN A WHP Oil and gas HUMMINGBIRD FPSO Oil and gas ERSKINE Oil and gas SCOTT JU Oil and gas ELGIN B WHP Oil and gas FORTIES CHARLIE Oil and gas CARDINAL BUOY 1 Oil and gas PRODUCTION (P) JACKET Oil and gas FLOTTA MARINE OIL TERMINAL Oil and gas BRITANNIA Oil and gas ETAP QU Oil and gas ALBA NORTH Oil and gas LOMOND Oil and gas ALBA Oil and gas GANNET A Oil and gas NIGG BAY Oil and gas GOLDEN EAGLE PUQ PLATFORM Oil and gas MONTROSE BLP PLATFORM Oil and gas QUARTERS UTILITIES (QU) JACKET Oil and gas WEST FRANKLIN WHP Oil and gas CULZEAN PROCESSING PLATFORM (CPF) Oil and gas FASP Oil and gas PIERCE FPSO HAEWENE BRIM Oil and gas FORTIES UNITY Oil and gas BRAE A Oil and gas CATCHER Oil and gas BERYL FLARE Oil and gas WELLHEAD (W) Oil and gas FORTIES ALPHA Oil and gas

Projects	
16/4 SOLVEIG BE Oil and gas **SLEIPNER R Oil and gas** **JOHAN SVERDRUP P1 Oil and gas** **16/1-CA ROLVSNES Oil and gas**	ARBROATH Oil and gas MARKER BUOY Oil and gas CULZEAN WHP JACKET Oil and gas
Tier 1b	
Blyth Demo Phase 2 **Dogger Bank B Offshore Wind Farm** **Acorn Carbon Capture and Storage** **Moray West Offshore Wind Farm** **Naert na Gaoithe Offshore Wind Farm** **Sofia Offshore Wind Farm** **NorthConnect Cables and pipelines** **JOHAN SVERDRUP H Oil and gas** **25/10 WI BALDER Oil and gas** **JOHAN SVERDRUP P Oil and gas**	JOHAN SVERDRUP P2 Oil and gas JOHAN SVERDRUP O Oil and gas 25/11 BALDER FT Oil and gas 25/11 BALDER D Oil and gas 25/11 BALDER B Oil and gas JOHAN SVERDRUP K Oil and gas 25/11 M4W BALDER Oil and gas JOHAN SVERDRUP Q Oil and gas
Tier 1c	
Blyth Demo Phase 2 Offshore Wind Farm **Dogger Bank C Offshore Wind Farm** **East Anglia ONE North Offshore Wind Farm** **East Anglia TWO Offshore Wind Farm** **Eastern Green Link 2 HVDC Cable and Cable Protection** **Green Volt Floating Offshore Wind Farm** **Hornsea Project FOUR Offshore Wind Farm** **Hornsea Project THREE Offshore Wind Farm** **Inch Cape Offshore Wind Farm** **Norfolk Boreas Offshore Wind Farm** **Norfolk Vanguard Offshore Wind Farm** **Sheringham and Dugeon Extension Offshore Wind Farm Extension** **Culzean Offshore Wind Farm** **Pentland Floating Offshore Wind Farm**	Pentland Floating Offshore Wind Demonstration Flagship – Metcentre Offshore Wind Farm EMEC Magallanes 2 Extension EMEC Orbital O2 - Phase 2 Meygen Pentland Firth Phase 2 Meygen Pentland First Phase 3 Orbital Marine Eday 1 CorPack wave cluster Orbital Eday 3 Orbital Eday 4 SEASTAR wave and tidal OCEANSTAR wave and tidal Seagreen 1A Offshore Wind Farm Northern Endurance Partnership East Coast Cluster (Net Zero Teeside and Zero Carbon Humber) Orion CCS (CS017) Poseidon Project (CS009)
Tier 1d	
Avalon Offshore Wind Farm **Berwick Bank Offshore Wind Farm** **Caledonia Offshore Wind Farm** **Cenos Floating Offshore Wind Farm** **Construction of Outfall Pipe - North base Jetty, Peterhead Harbour** **Dogger Bank South East Offshore Wind Farm** **Five Estuaries Offshore Wind Farm Offshore Wind Farm**	Muir Mhòr Floating Wind Farm Ossian Floating Offshore Wind Farm Outer Dowsing Offshore Wind Farm Salamander Offshore Wind Farm West of Orkney Offshore Wind Farm Berwick Bank Offshore Wind Farm Dogger Bank South West Offshore Wind Farm Viking CCS (Viking Cluster)

7.1.1.4 The Project is aware of other projects that are currently in Tier 3 and these will be assessed for consideration in the RIAA. An overview of the projects that will be considered for in-combination with the Project include:

- other offshore wind farms and associated cabling and infrastructure;

- other renewable energy developments (e.g. wave and tidal energy);
- oil and gas infrastructure (cables and pipelines);
- other cables and pipelines (e.g. telecommunications and interlinks);
- potential port / harbour development;
- beach replenishment schemes;
- aggregate, dredging and disposal schemes;
- carbon capture storage;
- onshore commercial developments;
- minerals;
- onshore energy (e.g. overhead lines and substations);
- residential developments;
- rights of way; and
- transport.

7.2 Marine mammals

7.2.1 Overview

7.2.1.1 This Section assesses the potential for the Project to contribute to in-combination effects on marine mammals, specifically the bottlenose dolphin population that is a qualifying feature of the Moray Firth SAC. The assessment follows relevant guidance (see **Section 3.3**) and considers whether, in-combination with other plans or projects, the Project could compromise the CO(s) of the SAC feature to result in an AEoSI.

7.2.1.2 Relevant projects were identified through an initial screening of a comprehensive 'long list' of developments (see **Volume 3, Appendix 33.1: Identification of Offshore 'Other Developments' for Cumulative Effects Assessment**). From this, a 'short list' of projects was established as part of the Cumulative Effects Assessment (CEA) presented within the **EIA Report** (see **Volume 1, Chapter 33: Cumulative Effects Assessment**).

7.2.1.3 Projects which have remained within the CEA include those which involve UWN-generating activities (for example, pile driving, cable trenching, seismic survey) or significant vessel activity within overlapping timeframes. On this basis, the following broad categories of developments were retained for further consideration:

- offshore wind farms and associated cabling and infrastructure;
- other renewable energy developments (for example, wave and tidal);
- oil and gas infrastructure (including pipelines and subsea works);
- carbon capture and storage infrastructure; and
- subsea cables and interconnectors.

7.2.1.4 For the purposes of this assessment, the CEA short list was further refined to include only projects within, or functionally connected to, the CES MU, which is considered synonymous with the Moray Firth SAC population (estimated at 226 individuals; see **Section 4.1** for more details). A precautionary approach was applied to include all projects that could reasonably interact spatially and temporally with the SAC feature. Projects that do not assess potential impacts relative to the CES MU population were excluded, as their findings cannot reliably inform in-combination effects on the SAC bottlenose dolphin population.

7.2.1.5 Projects retained for assessment therefore are those that either overlap spatially with the CES MU or involve activities originating in the Greater North Sea MU with impact ranges which propagate into the CES MU, thereby creating a functional connection to the Moray Firth SAC bottlenose dolphin population. In addition, projects with offshore export cable corridors crossing the CES MU and making landfall within the MU were included, as geophysical surveys and other pre-construction activities are highly likely to occur along these routes, resulting in increased vessel activity in nearshore habitats where the majority of CES MU bottlenose dolphin occur prior to cable installation.

7.2.1.6 The temporal scope of the assessment encompasses the Project's anticipated 12-year construction period (2030 to 2041), with an additional year either side applied as a precautionary buffer (2029 to 2042). This accounts for uncertainty in construction schedules across other developments and the timings of UWN-generating activities, such as pile driving, cable trenching, or seismic surveys. The timeframe therefore captures all relevant pre-construction, foundation installation, and WTG attachment phases as a precautionary measure.

7.2.1.7 Of the projects considered, several do not have any relevant pathways of effect to bottlenose dolphin associated with the Moray Firth SAC. These projects have therefore been excluded from this assessment with a clear justification provided in **Table 7.3**.

Table 7.3 Plans and projects identified for marine mammals in-combination assessment

Project	Development type	Status	Tier	Distance to Moray Firth SAC (km at closest point)	Expected construction dates	Expected dates of operation	Overlap with the Project	Taken forward into assessment?
Arven	Offshore wind (floating).	Pre-planning (Scoping Report).	2	267.6	2030-2033	Mid 2030s.	Construction and O&M stage interacts with the construction and O&M stage of the Project.	No - No considered spatial or functional overlap with CES MU.
Aspen	Offshore wind (floating).	Application submitted (EIA Report).	1d	102.4	2028-2031	2032	Construction and O&M stage interacts with the construction and O&M stage of the Project.	Yes
Ayre	Offshore wind (floating).	Pre-planning (Scoping Report).	2	51.9	2029-2033	2034	Construction and O&M stage interacts with the construction and O&M stage of the Project.	Yes
Bellrock	Offshore wind (floating).	Pre-planning (Scoping Report).	2	209	2028-2031	2031	Construction and O&M stage interacts with the construction and O&M stage of the Project.	No - No considered spatial or functional overlap with CES MU.
Berwick Bank	Offshore wind (fixed).	Consented (EIA Report).	1c	167	2025-2033	2034	Construction stage interacts with the construction stage of the Project.	Yes

Project	Development type	Status	Tier	Distance to Moray Firth SAC (km at closest point)	Expected construction dates	Expected dates of operation	Overlap with the Project	Taken forward into assessment?
Bowdun	Offshore wind (mixed).	Pre-planning (Scoping Report).	2	157.5	2029-2033	2034	Construction and O&M stage interacts with the construction and O&M stage of the Project.	Yes
Broadshore	Offshore wind (mixed).	Pre-planning (Scoping Report).	2	93	2028-2029	2030	Construction and O&M stage interacts with the construction and O&M stage of the Project.	No - No considered spatial or functional overlap with CES MU.
Buchan	Offshore wind (floating).	Pre-planning (Scoping Report).	2	128.8	2030-2034	2035	Construction and O&M stage interacts with the construction and O&M stage of the Project.	Yes
Caledonia	Offshore wind (mixed).	Application submitted but not yet determined (EIA Report).	1d	32	2028-2032	2033	Construction and O&M stage interacts with the construction and O&M stage of the Project.	Yes
Campion	Offshore wind (floating).	Pre-planning (Array Scoping Report).	2	185.5	2028-2030	2031	Construction and O&M stage interacts with the construction and O&M stage of the Project.	No - No considered spatial or functional overlap with CES MU.
Cenos	Offshore wind (floating).	Application submitted but not yet	1d	280	2030-2035	2036	Construction and O&M stage interacts	No - Only reported dose-response at

Project	Development type	Status	Tier	Distance to Moray Firth SAC (km at closest point)	Expected construction dates	Expected dates of operation	Overlap with the Project	Taken forward into assessment?
		determined (EIA Report).					with the construction and O&M stage of the Project.	Greater North Sea MU.
Culzean	Offshore wind (floating).	Consented (EIA Report).	1c	314.2	2025	2026	O&M stage interacts with the construction and O&M stage of the Project.	No - No considered spatial or functional overlap with CES MU.
Eastern Green Link 3 HVDC	Cables and pipelines.	Pre-planning	2	Not stated.	2029-2033	2034	Construction stage interacts with the construction stage of the Project.	Yes
Eastern Green Link 4 HVDC	Cables and pipelines.	Pre-planning	2	Not stated.	2029-2033	2033	Construction stage interacts with the construction stage of the Project.	Yes
Green Volt	Offshore wind (floating).	Consented (EIA Report).	1c	151	2026-2028	2029	Construction and O&M stage interacts with the construction and O&M stage of the Project.	No - Only reported dose-response at Greater North Sea MU.
Hywind	Offshore wind (floating).	Operational	1a	115.4	Decommissioning under development.	Since 2017.	O&M stage interacts with the construction and O&M stage of the Project.	Yes
Kincardine	Offshore wind (floating).	Operational	1a	114.7	N/A	Since 2021.	O&M stage interacts with the construction	Yes

Project	Development type	Status	Tier	Distance to Moray Firth SAC (km at closest point)	Expected construction dates	Expected dates of operation	Overlap with the Project	Taken forward into assessment?
							and O&M stage of the Project.	
Morven	Offshore wind (fixed).	Pre-planning (Scoping Report).	2	157	2027-2029	2030	Construction stage interacts with the construction stage of the Project.	No - No considered spatial or functional overlap with CES MU.
Muir Mhòr	Offshore wind (floating).	Application submitted but not yet determined (EIA Report).	1d	102	2029-2033	2034	Construction and O&M stage interacts with the construction and O&M stage of the Project.	Yes
Ossian	Offshore wind (floating).	Application submitted but not yet determined (EIA Report).	1d	175.9	2031-2038	2039	Construction and O&M stage interacts with the construction and O&M stage of the Project.	Yes
Pentland Floating	Offshore wind (floating).	Consented (EIA Report).	1c	125	2025-2026	2026	O&M stage interacts with the construction and O&M stage of the Project.	Yes
Salamander	Offshore wind (floating).	Consented (EIA Report).	1c	89	2028-2029	2030	O&M interacts with the construction and O&M stage of the Project.	Yes
Scaraben	Offshore wind (mixed).	Pre-planning (Scoping Report).	2	93	2029-2030	2031	Construction stage and O&M interacts	No - No considered spatial or functional

Project	Development type	Status	Tier	Distance to Moray Firth SAC (km at closest point)	Expected construction dates	Expected dates of operation	Overlap with the Project	Taken forward into assessment?
							with the construction and O&M stage of the Project.	overlap with CES MU.
Seagreen 1A	Offshore wind (fixed).	Consented (EIA Report).	1c	205.9	2029-2032	2033	Construction stage interacts with the construction stage of the Project.	Yes
Spittal to Peterhead Cable Link	Cables and pipelines.	Application submitted but not yet determined (Marine Environmental Assessment).	1d	Not stated.	2026-2030	2031	Construction stage interacts with the construction stage of the Project.	Yes
Stromar	Offshore wind (floating).	Pre-planning (Scoping Report).	2	60	2028-2030	2031	Construction and O&M stage interact with the construction and O&M stage of the Project.	Yes
West of Orkney	Offshore wind (fixed).	Consented (EIA Report).	1c	133.1	2028-2032	2032	Construction stage interacts with the construction stage of the Project.	No - Only reported dose-response at Greater North Sea MU.

7.2.2 Summary of impacts

7.2.2.1 The Project-alone assessment (**Section 6.1**) concluded that no AEoSI of the Moray Firth SAC bottlenose dolphin feature is anticipated. The purpose of this Section is therefore to determine whether the addition of other relevant plans and projects could alter that conclusion.

7.2.2.2 Certain impact pathways assessed for the Project alone are screened out of the in-combination assessment due to:

- the highly localised and / or short-term nature of the impacts;
- the application of management and environmental mitigation measures that will reduce the risk of in-combination effects occurring across all projects; and
- the Project-alone assessment concluding that the potential effects were negligible, and therefore, are not capable of contributing to an in-combination effect at the population level.

7.2.2.3 Therefore, **Table 7.4** presents the impacts screened out of the in-combination assessment from those listed in **Section 5.2.1**, with justification for the exclusion provided.

Table 7.4 Impacts screened out of the marine mammal in-combination assessment

Impact	Justification for screening out
Auditory injury (PTS) from UWN	Where PTS may result from activities such as piling, UXO clearance or seismic surveys, the implementation of mitigation measures (for example, JNCC 2010b, 2025b and 2017 guidance respectively) is a legal requirement across all projects to avoid offences in relation to European protected species (EPS) under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended in Scotland). These measures (for example, soft-starts, PAM, MMOs, acoustic deterrent devices, noise abatement systems) minimise the potential for injury to marine mammal receptors. Other non-piling construction noise sources are highly localised, and it is deemed that animals are highly unlikely to receive a PTS-onset from such activities. This is due to the sound characteristics of these activities, the natural evasive behaviour of marine mammals to noise and that the vessel noise from which the activities are being conducted being expected to deter animals from the immediate injury zone. Consequently, potential for in-combination effects is negligible.
Disturbance from UXO clearance	In line with the UK Government (2025) joint position statement, UXO campaigns across projects are expected to use low order deflagration techniques with proven effectiveness. Detonation of a UXO would cause a brief startle response but not prolonged displacement (JNCC, 2025b). Given the very short duration of exposure, in-combination effects are not anticipated.
Disturbance from other non-piling construction activities (for example, cable-laying, drilling, rock placement)	Disturbance associated with activities such as drilling, cable-laying, and rock placement are highly localised. Any potential impact, such as masking or short-term behavioural alterations, from these activities will be less than that of vessel disturbance and will not

Impact	Justification for screening out
	occur in the absence of vessel noise which is already considered separately. No additional in-combination risk is anticipated.
Collision risk from vessels	Across all projects, vessel speeds, routing and codes of conduct are applied in line with best-practice guidance to minimise collision risk with marine mammals. The residual likelihood of collision is therefore very low, and **No Significant** in-combination effect is anticipated.
Indirect effects on prey	Any changes to prey availability are expected to be highly localised and temporary. Dolphins are also generalist feeders with access to alternative foraging areas; therefore, **No Significant** in-combination effect is anticipated for bottlenose dolphins associated with the Moray Firth SAC.
Entanglement risk with associated lines / cables and potential secondary entanglement	Direct entanglement with floating offshore WTG mooring lines or dynamic cables is considered highly unlikely due to the taut configuration, large line diameters, and the agility and echolocation abilities of bottlenose dolphins. It is also unlikely that individuals from the Moray Firth SAC population (inshore ecotype) will be found within the OAA, given the predominantly coastal distribution of these individuals. Due to this, secondary entanglement via snagged fishing gear is also unlikely for this population of bottlenose dolphin. Embedded measures (for example, cable burial where practicable (M-054, M-057), inspection and maintenance of moorings (M-122)) further reduce potential exposure. Given the location of Project infrastructure outside SAC and MU boundaries, **No Significant** in-combination risk is predicted.

7.2.2.4 On the basis of this screening, the following impact pathways are taken forward for assessment in-combination with other relevant plans and projects:

- disturbance from UWN during construction (including piling and site investigation surveys);
- disturbance from UWN from operational WTGs and cables; and
- vessel disturbance.

7.2.2.5 These pathways are retained due to their potential to result in behavioural disturbance to SAC-associated bottlenose dolphins, particularly where multiple projects may overlap spatially or temporally.

7.2.2.6 The construction stage is considered to represent the maximum design scenario for all retained pathways, due to the higher intensity and diversity of activities such as piling, UXO clearance, and increased vessel traffic. Where the Project-alone assessment has concluded that no AEoSI is anticipated during the construction stage, it is reasonable to infer that **No Significant** effect is likely to arise during the O&M or decommissioning stages, which involve lower levels of activity and more predictable patterns of disturbance. This rationale based on the maximum design scenario is carried forward into the in-combination assessment.

7.2.3 In-combination assessment for marine mammals

Disturbance from underwater noise from pre-construction surveys

7.2.3.1 This Section assesses the potential for the Project, in-combination with other relevant plans and projects, to result in behavioural disturbance from UWN generated during pre-construction and site investigation surveys to bottlenose dolphins associated with the Moray Firth SAC. The assessment is undertaken with reference to the following site COs:

- **CO 1:** To ensure that the qualifying features of the Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS; and
- **CO 2b:** The distribution of bottlenose dolphin throughout the site is maintained by avoiding significant disturbance.

7.2.3.2 For the purposes of this assessment, significant disturbance is defined in line with JNCC (2020) and NatureScot (2025c) guidance as any impact that results in more than a transient effect on the distribution of bottlenose dolphins. Such disturbance may result in the following effects:

- contributes to the long-term decline in the use of the site by bottlenose dolphin;
- changes to the distribution of bottlenose dolphin on a continuing or sustained basis; or
- changes to bottlenose dolphin behaviour such that it reduced the ability of the species to survive, breed, or rear their young.

7.2.3.3 The potential for disturbance from site-investigation surveys (primarily geophysical survey methods) for the Project alone has been assessed in **Section 6.1.2**. In summary, behavioural disturbance is predicted to be highly localised (≤141m from source), short-term, and reversible, with **No Significant** effects on individual health, fitness, or reproductive success.

7.2.3.4 Pre-construction surveys for the Project are expected to occur during the early stages of each construction stage, with an estimated duration of one year per stage (across years one to two, four to five and seven to nine). There is higher uncertainty when site-investigation surveys will occur within the final stage of construction which explains why the activities could occur within three potential years in the proposed programme. Therefore, surveys could take place intermittently over an approximate nine-year period (years one to nine).

7.2.3.5 The construction window for the Project spans 2030-2041 (up to 12 years), during which other offshore wind projects in the wider CES MU region are also expected to undertake pre-construction activities. Although no specific information on the timing or location of these surveys is currently available, under a precautionary approach, it is assumed that some of these projects may conduct pre-construction surveys within overlapping timeframes and areas, particularly during the early years of the Project’s construction window when several developments are likely to be active. This creates potential for temporal and spatial overlap of pre-construction survey activities across projects within the wider CES MU region, which is considered in the in-combination assessment.

7.2.3.6 Based on available evidence (CSA, 2020; JNCC, 2017; 2025a), disturbance from geophysical surveys is expected to be localised to tens to hundreds of metres from the source and cease once animals move away from the active survey area. Even under a precautionary assumption of multiple concurrent surveys, the spatial footprint of disturbance remains small relative to the extent of the Moray Firth SAC and the wider range of the bottlenose dolphin population. Furthermore, all projects will be required to implement environmental measures consistent with JNCC guidance (for example, MMO / PAM pre-survey monitoring and mitigation zones), which will further reduce the risk of impacts.

7.2.3.7 The predicted effects are not expected to impact individual health, fitness, or reproductive success. Cumulative disturbance from pre-construction surveys is not predicted to result in any significant negative effects on individuals or the population associated with the Moray Firth SAC. Nor is it expected to result in changes in distribution (CO 2b) or compromise favourable condition (CO 1). It is therefore concluded that the Project, in-combination with other relevant plans and projects, will not result in any AEoSI in relation to behavioural disturbance from pre-construction surveys, and that, subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Disturbance from underwater noise from piling

7.2.3.8 This Section assesses the potential for the Project, in-combination with other relevant plans and projects, to result in behavioural disturbance from UWN generated during piling activities to bottlenose dolphins associated with the Moray Firth SAC. The assessment is undertaken with reference to the following site COs:

- **CO 1:** To ensure that the qualifying features of the Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS; and
- **CO 2b:** The distribution of bottlenose dolphin throughout the site is maintained by avoiding significant disturbance.

7.2.3.9 The potential for disturbance from pile driving during construction of the Project alone has been assessed in **Section 6.1.2.** In summary, behavioural disturbance from piling is temporary and localised, with a precautionary maximum of 60 individuals predicted to be disturbed on any piling day (26.55 per cent of the CES MU population). This scenario will be limited to two days estimated to install the pin piles for the South RCP. The majority of pile driving will fall under the 31 individuals (13.72 per cent of the CES MU population) disturbed on any piling day based off modelling conducted in the N offshore substation location. Population-level effects for the Project alone were assessed using iPCoD modelling (presented in **Volume 3, Appendix 11.2**) predicts that the bottlenose dolphin population will continue to grow, though at a slightly reduced rate compared to an unimpacted population, indicating that the Project is not expected to cause population-level decline (see **Section 6.1.2.77** to **Section 6.1.2.78** for full details).

7.2.3.10 The in-combination assessment applies the same dose-response framework used in the Project-alone assessment (derived from Graham *et al*., 2017b for harbour porpoise and applied precautionarily to bottlenose dolphin; refer to **Section 6.1.1** for more detail), assuming a baseline of 31 individuals potentially disturbed per piling day for the majority of the pile driving (N offshore substation). For Tier 1 projects (for instance, those with submitted or consented EIA Reports), project-specific dose-response contours are available to estimate the number of CES MU bottlenose dolphins potentially disturbed. For Tier 2 projects (for instance, those at earlier planning stages where site-specific UWN modelling outputs are not yet available), an EDR is used to estimate the spatial extent of disturbance based on comparable technology and indicative construction parameters, following JNCC (2020) guidance. Therefore, the following EDRs are applied:

- 26km EDR for proposed fixed offshore wind farm utilising monopile installations; and
- 15km EDR for proposed floating offshore wind farm utilising pin-pile installations.

7.2.3.11 Caution should be applied, however, when making direct comparisons between numbers of disturbed animals derived from project-specific UWN modelling and those derived from the EDR approach, as these methods are not directly comparable. EDRs were developed to determine the average distances over which harbour porpoise would be disturbed /

displaces in their SAC in English, Welsh and Northern Irish marine areas. The EDRs have been applied across the bottlenose dolphin population in the absence of species-specific guidance.

7.2.3.12 Furthermore, these EDRs have since been updated in the JNCC (2025c) guidance where the EDR for monopile installation without noise abatement has decreased from 26km (included in this assessment) to 20km, based on evidence from PAM studies (for example, Brandt *et al*., 2018; Geelhoed *et al*., 2018; Thompson *et al*., 2025). However, the EDR for pin pile installation without noise abatement has increased in the latest guidance from 15km (included in this assessment) to 20km. Brown *et al*. (2025) note that there remains uncertainty in the evidence of disturbance from pile driving and estimated the impact to be between 15km-20km. The JNCC (2025c) guidance took the higher end of this range as a precautionary measure.

7.2.3.13 Of the projects identified in **Table 7.3**, only those with temporal overlap in construction between 2029-2042 and pile driving disturbance impact ranges extending into the CES MU boundary, which is ecologically connected to the Moray Firth SAC, have the potential to contribute to in-combination effects. Based on available information, this includes:

- Aspen (Tier 1d; EIA Report);
- Ayre (Tier 2; Scoping Report);
- Berwick Bank (Tier 1d; EIA Report);
- Bowdun (Tier 2; Scoping Report);
- Buchan (Tier 2; Scoping Report);
- Caledonia (Tier 1d; EIA Report);
- Muir Mhòr (Tier 1d; EIA Report);
- Ossian (Tier 1d; EIA Report);
- Seagreen 1A (Tier 1a; EIA Report); and
- Stromar (Tier 2; Scoping Report).

7.2.3.14 The piling window for the Project spans 2030-2041 (up to 12 years), with up to 1,856 piling days assumed under the maximum design scenario. Piling will occur in discrete campaigns with breaks between operations, meaning that disturbance will be intermittent and temporary rather than sustained over the entire period. Piling years for the Project are expected to be in 2033, 2036, 2038 and 3039. In the absence of detailed, final construction schedules for all projects, a worst-case temporal overlap is assumed for years where multiple projects indicate piling activity. Estimates represent instantaneous (per piling day) disturbance, meaning they do not imply continuous displacement throughout a year.

7.2.3.15 **Table 7.5** presents the maximum daily number of bottlenose dolphins from the CES MU predicted to be disturbed per project in each year, under the conservative assumption of coincident piling on the same day.

Table 7.5 Number of bottlenose dolphins in the CES MU disturbed per piling day per project[3]

Project	Source	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Marram (the Project)	Dose-response					31			31		31	31			
Aspen	Dose-response	5	5	5											
Ayre	15km EDR.	14	14	14	14	14									
Berwick Bank	Dose-response	4	4	4	4	4									
Bowdun	26km EDR.	11	11	11	11	11									
Buchan	15km EDR.		7	7	7	7	7								
Caledonia	Dose-response	52	52	52	52										
Muir Mhòr	Dose-response	8	8	8											
Ossian	Dose-response			4	4	4	4	4	4	4	4				
Seagreen 1A	Dose-response	4	4	4	4										

[3] Colour co-ordination for table: blue = concept / in planning / consenting, orange = construction, green = offshore wind farm is expected to be operational.

Project	Source	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042
Stromar	15km EDR.	9	9												
Total		107	114	109	96	71	11	4	35	4	35	31	0	0	0
% of CES MU		47.35	50.44	48.23	42.48	31.42	4.87	1.77	15.49	1.77	15.49	13.72	0.00	0.00	0.00

7.2.3.16 The highest number of bottlenose dolphins from the CES MU predicted to be disturbed per piling day across all Tier 1 and Tier 2 projects between 2029 and 2042 is 114 individuals in 2030, representing 50.44 per cent of the MU population. Notably, this peak does not coincide with the Project's anticipated pile driving campaign, which is assumed for 2033, 2036, 2038 and 2039. The maximum cumulative disturbance during the Project's piling campaign is predicted to occur in 2033, with 71 individuals (31.42 per cent of the CES MU population) potentially disturbed per piling day. Of this, the Project contributes 31 individuals, or 43.66 per cent of the total disturbance on that day.

7.2.3.17 Although the worst-case daily disturbance percentages can appear high in years of peak activity (up to 50.44 per cent of the CES MU population between 2029 and 2031), these represent instantaneous disturbance and do not equate to sustained displacement across a season or year. In practice, piling activities are expected to occur intermittently, with variable daily durations, limiting cumulative exposure for individual dolphins. Additionally, piling from the other considered developments contributing to peak disturbance levels are expected to complete prior to the Project's piling commencement, further reducing the likelihood of simultaneous disturbance. The highest predicted totals are largely driven by Caledonia offshore wind farm, which contributes up to 52 individuals per day in peak years (2029-2032 when percentage of the CES MU potentially disturbed is at least 40 per cent). Therefore, the elevated percentages reflect a precautionary assumption rather than a sustained or population-wide level of impact.

7.2.3.18 The assessment also applies precautionary assumptions by using a dose-response relationship and EDRs derived for harbour porpoise, a species considered more sensitive than bottlenose dolphin, which likely overestimates behavioural responses. Furthermore, the spatial separation between arrays and their location outside the Moray Firth SAC means that received noise levels within the SAC itself are expected to be below recognised behavioural disturbance thresholds.

7.2.3.19 All projects will be required to implement JNCC-compliant environmental measures (JNCC, 2010a) under their EPS licences, including soft-start procedures, PAM / MMO monitoring, and mitigation zones. These measures are proven to reduce both the likelihood and magnitude of behavioural disturbance. Coordination of piling schedules between developers, as has occurred in previous Scottish offshore wind projects, is also likely to reduce real-world overlap compared with the conservative assumption applied here.

7.2.3.20 To assess whether the level of cumulative disturbance from piling across multiple projects could lead to population level impacts, cumulative iPCoD modelling was conducted (see **Volume 3, Appendix 11.2**). The modelling incorporated a precautionary assumption of temporal overlap in piling activity across projects. The modelling results indicate that, while disturbance has the potential to influence the dynamics of the CES MU population, the population is predicted to continue on an increasing trajectory under all scenarios tested.

7.2.3.21 Specifically, cumulative iPCoD modelling predicts the impacted CES MU population will continue to increase from a pre-piling estimate of 228 individuals in 2028 to 465 individuals by 2051 (for instance, 12 years after the end of cumulative piling), representing a 104 per cent increase in population size over the assessment period. During piling, a temporary reduction in population size relative to the unimpacted trajectory are predicted, with the largest difference occurring in 2040 when the impacted population (310 individuals) is 85.4 per cent of the unimpacted population (363 individuals). The impacted population is expected to stabilise at approximately 86.5 per cent of the unimpacted population post-piling. The impacted population is then predicted to continue on an increasing trajectory, the same as the un-impacted population, albeit at a lower population size.

7.2.3.22 These findings indicate that, although cumulative disturbance could result in a modest reduction in relative population size during and immediately after piling, the population continues to increase throughout and after the construction period. Taking into account the precautionary modelling method and uncertainty within the data used, conservative overlap assumption, the environmental mitigation measures to be implemented across projects by adhering to a MMMP (M-032), the temporary and intermittent nature of piling, and the cumulative iPCoD findings, cumulative disturbance from piling is not predicted to result in any significant negative effects on individuals or the population associated with the Moray Firth SAC. Nor is it expected to result in changes to distribution (CO 2b) or compromise favourable condition (CO 1).

7.2.3.23 It is therefore concluded that disturbance from piling noise from the Project, in-combination with other plans and projects, will not result in any AEoSI for bottlenose dolphins associated with the Moray Firth SAC. Subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Disturbance from underwater noise from operational WTGs and cables

7.2.3.24 This Section assesses the potential for UWN generated during the O&M stage of the Project, in-combination with other relevant plans and projects, to disturb bottlenose dolphins associated with the Moray Firth SAC. The assessment is undertaken with reference to the following site COs:

- **CO 1:** To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS;
- **CO 2a:** The population of bottlenose dolphin is a viable component of the site; and
- **CO 2b:** The distribution of bottlenose dolphin throughout the site is maintained by avoiding significant disturbance.

7.2.3.25 Noise levels recorded from demonstrator projects such as Hywind Norway and Hywind Scotland are low, with most energy concentrated below 100 hertz, which is outside the peak hearing sensitivity of bottlenose dolphins. These sounds are typically indistinguishable from ambient background noise and are unlikely to elicit behavioural responses at typical exposure distances. The Project's OAA location is approximately 150km from the SAC boundary, which further reduces the likelihood of exposure to SAC-associated individuals. Given this, the Project-alone assessment concluded that operational noise from floating WTGs and associated cable and mooring systems is not expected to result in significant behavioural disturbance to SAC-associated bottlenose dolphins (see **Section 6.1.3** for full details).

7.2.3.26 Cumulative operational noise from other floating offshore wind farm developments in the wider Moray Firth region is assessed for the potential contribution to in-combination impacts on the CES MU bottlenose dolphin population. Of the 18 potential projects taken forward into the in-combination assessment (see **Table 7.3**), 11 are proposed or operational floating offshore wind farm, which include associated infrastructure such as mooring systems and dynamic cables. These projects are of particular relevance because, while their operational characteristics are broadly comparable to the Project, there is currently limited empirical evidence on long-term operational noise from floating systems compared to fixed-bottom foundations. Available data from demonstrator projects (for example, Hywind Scotland) indicate low noise levels, but uncertainty remains due to the relatively early stage of commercial-scale deployment. However, despite current uncertainty around noise levels, findings from future monitoring data will be incorporated into adaptive management throughout the O&M stage of the Project.

7.2.3.27 While some floating offshore wind farm developments occur within the CES MU, which is considered ecologically connected to the Moray Firth SAC, the predicted acoustic footprint of floating WTGs is expected to be localised and limited to the OAAs of individual developments, which are situated well outside the SAC boundary and away from core habitat areas. Bottlenose dolphins are known to range widely across the CES MU; however, there is currently no evidence to suggest that the presence of floating offshore wind infrastructure has deterred SAC-associated individuals from using these areas (Wawrzynkowski *et al*., 2025).

7.2.3.28 Given the species' mobility, behavioural resilience, and the low intensity of operational noise, cumulative exposure from multiple projects is not expected to result in any significant negative effects on individuals or the population associated with the Moray Firth SAC. Nor is it expected to result in changes to distribution (CO 2b), compromise population viability (CO 2a), or affect the favourable condition of the qualifying feature (CO 1). It is therefore concluded that disturbance from operational noise from WTGs and cables from the Project, in-combination with other relevant plans and projects, will not result in any AEoSI for bottlenose dolphins associated with the Moray Firth SAC. Subject to natural change, the population of bottlenose dolphin will be maintained in the long-term.

Vessel disturbance

7.2.3.29 This Section assesses the potential for in-combination vessel disturbance to bottlenose dolphins associated with the Moray Firth SAC across the construction, O&M, and decommissioning stages of the Project and other relevant plans and projects. The assessment is undertaken with reference to the following site COs:

- **CO 1:** To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS; and
- **CO 2b:** The distribution of bottlenose dolphin throughout the site is maintained by avoiding significant disturbance.

7.2.3.30 The potential for vessel disturbance from the Project alone has been assessed in **Section 6.1.2** and **Section 6.1.3**. It was concluded that, due to the location of the Project outside the SAC, the low likelihood of SAC-associated dolphins being present along vessel routes, and the application of best-practice vessel management measures, including designated transit routes and speed restrictions, **No Significant** behavioural disturbance is predicted. Therefore, no AEoSI was identified from the Project alone across any stage.

7.2.3.31 Vessel activity associated with other offshore wind farm developments, UXO clearance campaigns, and marine infrastructure projects in the wider Moray Firth and CES MU region may contribute to cumulative vessel presence across the construction, O&M and decommissioning stages of the relevant developments; however, several factors limit the potential for in-combination effects.

7.2.3.32 All projects are expected to implement a vessel management and navigational safety plan outlining defined vessel routes and operational controls, including speed restrictions and codes of conduct, such as those outlined by the SMWWC. These measures reduce the likelihood of unpredictable or repeated close approaches that are known to elicit behavioural responses in cetaceans (Bejder *et al*., 2006).

7.2.3.33 The spatial separation of project footprints and vessel routes from the SAC further reduces the likelihood of interaction with SAC-associated dolphins. Most vessel activity will occur outside the SAC boundary, and dolphins would only be exposed if they move into nearshore or offshore waters intersected by transit routes.

7.2.3.34 Bottlenose dolphins in the Moray Firth are considered habituated to a background level of vessel traffic, including commercial shipping and recreational boating (Lusseau, 2006; Arso Civil *et al.,* 2019). Furthermore, the types of vessels used during construction and decommissioning are typically large and slow-moving or stationary for extended periods, while operational vessels follow predictable maintenance schedules. These characteristics reduce the likelihood of eliciting behavioural responses.

7.2.3.35 Although vessel activity from multiple developments may intersect with areas used by SAC-associated bottlenose dolphins, potentially leading to short-term disturbance, cumulative exposure throughout the lifespans of the in-combination developments is not predicted to result in sustained changes to dolphin distribution, long-term site avoidance, or behavioural changes that could compromise population viability. Given the temporary and spatially limited nature of vessel activity, the separation from key SAC use areas, and the environmental measures to be implemented across projects, **No Significant** negative effects on individuals or the population associated with the Moray Firth SAC are anticipated. Nor is it expected to result in change to distribution (CO 2b) or compromise favourable condition (CO 1). It is therefore concluded that vessel disturbance from the Project, in-combination with other relevant plans and projects, will not result in an AEoSI for bottlenose dolphins associated with the Moray Firth SAC, and that subject to natural change, the population will be maintained in the long-term.

7.2.4 In-combination assessment summary for marine mammals

7.2.4.1 This Section provides a summary of the in-combination assessment for bottlenose dolphin, the sole qualifying feature of the Moray Firth SAC relevant to the Project. The assessment considers potential impact pathways identified through screening (see **Section 7.2.1**) and evaluates them against the site's COs.

7.2.4.2 The assessment draws on detailed modelling, precautionary assumptions, and embedded measures, as outlined in **Section 7.2.3**. **Table 7.6** presents the outcome of this assessment, including a concise justification for the conclusion of no AEoSI for each pathway.

Table 7.6 Summary of AEoSIs for marine mammals (in-combination)

Designated site	Qualifying feature(s)	Impact Pathway	Conservation Objectives	Justification for AEoSI Conclusion	AEoSI Conclusion
Moray Firth SAC	Bottlenose dolphin.	UWN (disturbance from pre-construction surveys).	**CO 1:** To ensure that the qualifying features of Moray Firth SAC are in favourable condition and make an appropriate contribution to achieving FCS.	Pre-construction survey disturbance is highly localised, short-term, and reversible. Even under a precautionary assumption of multiple overlapping surveys, the spatial footprint is small relative to the SAC and wider CES MU. All projects will implement embedded measures and coordination to reduce risk. No significant effects on individual health, fitness, or distribution are predicted.	No AEoSI.
			CO 2b: The distribution of bottlenose dolphin throughout the site is maintained by avoiding significant disturbance.		
		UWN (disturbance from piling during construction).	**CO 1**	Disturbance is temporary and intermittent. All projects will implement embedded measures and coordination to reduce risk.	No AEoSI.
			CO 2b		
		UWN (disturbance from operational WTGs and cables).	**CO1**	Operational noise from floating WTGs is within ambient noise levels and outside peak bottlenose dolphin hearing sensitivity. Project OAA is located 150km from SAC boundary. Even under a precautionary scenario with multiple projects, cumulative exposure is not expected to affect individual health, distribution, or population viability.	No AEoSI.
			CO 2a: The population of bottlenose dolphin is a viable component of the site.		
			CO 2b		

Designated site	Qualifying feature(s)	Impact Pathway	Conservation Objectives	Justification for AEoSI Conclusion	AEoSI Conclusion
		Vessel disturbance.	**CO1** **CO 2b**	Most activity predicted to occur outside SAC boundary. All projects are expected to implement a form of vessel management and navigational safety plan, outlining defined transit routes and speed restrictions, reducing risk of disturbance. Vessels used for offshore wind farm construction are typically slow-moving or stationary. No sustained behavioural changes or population-level effects are predicted.	No AEoSI.

7.3 Offshore ornithology

7.3.1.1 The assessment on AEoSI in-combination for offshore ornithology is provided in **Appendix E**.

7.4 Intertidal ornithology

7.4.1.1 The assessment on AEoSI in-combination for intertidal ornithology is provided in **Appendix E**.

7.5 Terrestrial ecology and ornithology

7.5.1.1 Following a screening of short-listed projects presented in **Volume 3, Appendix 33.2 Identification of Onshore 'Other Developments' for Cumulative Effects Assessment** of the **EIA Report**, a total of five Tier 1 or Tier 2 projects were identified and screened into the assessment for potential in combination effects with the Project in respect to the Loch of Strathbeg SPA / Ramsar qualifying pink-footed goose population. The assessment is presented in **Table 7.7**.

7.5.1.2 Based on the assessment presented in **Table 7.7**, no significant in combination effects are predicted for any of the identified projects.

Table 7.7 In-combination assessment for terrestrial ecology and ornithology

Name of 'other development' and Applicant	Assessment of in combination effects with the Project	Proposed embedded environmental measures	Residual in combination effect
Green Volt Offshore Wind Farm (Onshore Infrastructure)	Green Volt Offshore Wind Farm is at the consented planning stage. Infrastructure elements directly cross the River Ugie in two places, including crossings through the North Ugie Water and South Ugie Water, upstream of the proposed onshore export cable corridor of the Project. Green Volt Offshore Wind Farm's landfall(s) also shares the same land parcel as the Lunderton South landfall of the Project. However, of the identified Important Ecological Features (IEFs) for the Project, pink-footed geese were not identified within a ZOI. It is assumed that good industry practice measures will be successfully implemented on the Green Volt Offshore Wind Farm site as set out within the EIA (Green Volt Offshore Wind Limited, 2023) to ensure there are no significant effects.	M-001 M-002 M-005 M-006 M-009 M-011 M-012 M-027 M-063 M-066 M-085 M-133 M-134 M-135 M-213 M-214	Based on the successful implementation of the embedded environmental measures from both projects, there would be no potential for in combination effects to arise.
Kirkton Solar Photovoltaic and energy storage facility	Kirkton Solar Photovoltaic and energy storage facility is at the consented planning stage and it overlaps the Red Line Boundary of the Scotstown Landfall. Of the identified IEFs, pink-footed geese were recorded foraging during all baseline survey visits and		Based on the successful implementation of the embedded environmental measures from both projects, there would be no potential for in combination effects to arise.

Name of 'other development' and Applicant	Assessment of in combination effects with the Project	Proposed embedded environmental measures	Residual in combination effect
	the SPA lies within the core foraging range for pink-footed goose. However, following the implementation of the mitigation measures detailed in the Kirkton Solar PV Ecological Assessment Report, which reduced the effects of the development to IEFs throughout all phases of its lifespan, no significant residual negative effects were predicted. In regard to the in-combination assessment prepared within the Kirkton Storage Facility HRA, all potential effects assessed in developments within 20 km were predicted to have either a negligible effect or no effect on the SPA populations.		
Salamander Offshore Wind Farm	Salamander Offshore Wind Farm has been consented and shares the same land parcel as the Lunderton North landfall and associated export cable corridor which crosses, via HDD, the A90. The area of the Salamander Offshore Wind Farm onshore transmission infrastructure was not found to be used regularly by pink-footed geese, with only low numbers recorded during the surveys within the site. Any disturbance was considered short-term, localised and temporary and would be minimised at the landfall(s) due to the trenchless installation and there was considered		Based on the successful implementation of the embedded environmental measures from both projects, there would be no potential for in combination effects to arise.

Name of 'other development' and Applicant	Assessment of in combination effects with the Project	Proposed embedded environmental measures	Residual in combination effect
	an abundance of alternative foraging resources for the duration of the temporary disturbance during construction. It is assumed that good industry practice measures will be successfully implemented as set out within the Salamander Offshore Wind Farm EIA Report to ensure there are no significant effects.		
Muir Mhòr Offshore Wind Farm	Muir Mhòr Offshore Wind Farm onshore infrastructure intersects the Onshore Red Line Boundary at the Lunderton North landfall and associated export cable corridor which crosses, via HDD, the A90 and River Ugie. The Muir Mhòr Offshore Wind Farm ecological assessment found that the study area is without Ecological Importance in the context of the EcIA. The Muir Mhòr Offshore Wind Farm ornithological assessment did not predict any species as being affected to more than a negligible level and no cumulative effects are predicted on the ornithological features described, including pink-footed geese. It is therefore assumed that good industry practice measures will be successfully implemented, as set out within the Muir Mhòr Offshore Wind Farm EIA Report, to ensure there are no significant effects.		Based on the successful implementation of the embedded environmental measures from both projects, there would be no potential for in combination effects to arise.

Name of 'other development' and Applicant	Assessment of in combination effects with the Project	Proposed embedded environmental measures	Residual in combination effect
Installation of Battery Energy Storage System (BESS) with an Installed Capacity of 180MW and Associated Infrastructure (Salamander project)	While a separate application, the BESS forms part of the wider Salamander Offshore Wind Farm project and it shares the same land parcel and assessment as above. It is therefore assumed that good industry practice measures will be successfully implemented as set out within the Salamander Offshore Wind Farm EIA Report to ensure there are no significant effects.		Based on the successful implementation of the embedded environmental measures from both projects, there would be no potential for in combination effects to arise.

8. Summary of RIAA and Conclusion

8.1 Overview

8.1.1.1 A summary of the assessment is presented in **Table 8.1**. This identifies the designated sites (together with the relevant feature(s)) screened in for effect in relation to the Project alone and in-combination.

8.2 Marine mammals

8.2.1.1 The assessment has considered all relevant impact pathways associated with the Project, both alone and in-combination with other plans and projects, in relation to bottlenose dolphins, the qualifying feature of the Moray Firth SAC. Potential effects from UWN (including piling, UXO clearance, pre-construction surveys, and other construction activities), vessel disturbance, vessel collision risk, entanglement, and indirect impacts on prey have been evaluated against the site's conservation objectives. All assessments were undertaken using precautionary assumptions in line with the Habitats Regulations, ensuring that potential effects were not underestimated.

8.2.1.2 For the Project alone, all predicted impacts — whether relating to auditory injury or behavioural disturbance — are temporary, spatially limited, and subject to embedded mitigation measures. No individuals from the SAC population are expected to be exposed to injury-level noise, and behavioural responses are not anticipated to result in sustained displacement or population-level effects.

8.2.1.3 In terms of the Project's in-combination effects, all predicted impacts — specifically those related to behavioural disturbance from UWN and vessel activity — are expected to be temporary, spatially restricted, and mitigated through embedded environmental measures. No individuals from the Moray Firth SAC population are anticipated to experience prolonged displacement, and any behavioural responses are expected to be short-term and reversible. These impacts are not predicted to result in population-level consequences, and the overall integrity of the SAC is not considered to be at risk.

8.2.1.4 It is therefore concluded that the Project, alone and in-combination with other relevant plans and projects, will not result in an AEoSI of the Moray Firth SAC, and that the conservation objectives for bottlenose dolphins will continue to be met. This conclusion is supported by project-specific underwater noise modelling and population dynamic modelling (iPCoD), which predict no adverse population-level effects under precautionary assumptions. Subject to implementation of the embedded mitigation measures and ongoing engagement with regulators, the Project will not hinder the achievement of the Conservation Objectives of the Moray Firth SAC, ensuring long-term protection of bottlenose dolphin populations.

8.3 Offshore ornithology

8.3.1.1 The assessment has considered all relevant impact pathways associated with the Project, both alone and in-combination with other plans and projects, where relevant. Potential effects from direct temporary habitat loss (offshore export cable corridor), light pollution (OAA), distributional responses (OAA), collision risk (OAA) and entanglement with mooring lines (OAA) have been evaluated against the Conservation Objectives for designated sites screened in for assessment.

8.3.1.2 For the Project alone, the potential for an AEoSI could not be ruled out for the guillemot feature of Buchan Ness to Collieston Coast SPA in relation to distributional response effects (OAA), though only when considering the upper limit of the guidance approach. This is due to PVA results predicting a reduction in growth rate of 0.48% per annum. Such a reduction in growth rate could not be ruled out as potentially effecting the long-term integrity of the feature.

8.3.1.3 For all other Project alone assessments, the potential for an AEoSI was confidently ruled out due to minimal predicted impact to qualifying features survival rate. Therefore, any potential impact would be indistinguishable from natural fluctuations in the population.

8.3.1.4 For the Project in-combination with other plans and projects, the potential for an AEoSI could not be ruled out for the guillemot feature of Buchan Ness to Collieston Coast SPA, Troup, Pennan and Lion's Heads SPA and Copinsay SPA in relation to distributional response effects (OAA). This is due to PVA results predicting a reduction in growth rate which could not be ruled out as potentially effecting the long-term integrity of the features.

8.3.1.5 As the potential for an AEoSI could not be ruled out for the above features and designated sites, the Project reviewed the potential for further mitigation to be implemented. However, no possible mitigation was identified which would reduce the overall predicted impact to a level where the potential for an AEoSI could be confidently ruled out, without compromising the economic feasibility of the Project. Therefore, the Project has proposed a package of compensatory measures within the derogation process under Steps 3 and 4 of HRA. Further details of the Project's derogation case is provided within MarramWind Derogation Case.

8.4 Intertidal ornithology

8.4.1.1 The assessment has considered all relevant impact pathways associated with the Project, both alone and in-combination with other plans and projects, in relation to the guillemot and shag feature of Buchan Ness to Collieston Coast SPA and the eider feature of Ythan Estuary, Sands of Forvie and Meikle Loch SPA. Potential effect from direct temporary disturbance and displacement (offshore export cable corridor and landfall) has been evaluated against the COs for designated sites screened in for assessment.

8.4.1.2 For the Project alone, the potential for an AEoSI was confidently ruled out for all designated sites and features due to the potential impact being short term and spatially limited combined with commitment to HDD (see **Appendix B**; M-056), minimising work required within the intertidal zone.

8.4.1.3 The potential for LSE in-combination was confidently ruled out for all designated sites and features due to the potential effect from direct temporary disturbance and displacement (offshore export cable corridor and landfall) being both spatially and temporally limited, significantly limiting the potential for an in-combination effect to occur. The Project has also committed to installation using HDD (see **Appendix B**; M-056) further reducing the potential for an in-combination effect to occur.

8.4.1.4 It is therefore concluded that the Project, alone and in-combination with other relevant projects, will not result in an AEoSI for all designated sites and features screened in for assessment.

8.5 Terrestrial ecology and ornithology

8.5.1.1 The assessment has considered all relevant impact pathways associated with the Project, both alone and in-combination with other projects, in relation to pink-footed goose, a qualifying feature of the Loch of Strathbeg SPA / Ramsar. Potential effects from Project activities at Scotstown landfall contributing to land take / land cover change and associated disturbance and / or displacement effects have been evaluated against the COs of the Loch of Strathbeg SPA / Ramsar.

8.5.1.2 For the Project alone, all predicted impacts, whether relating to temporary land cover / land take or disturbance or displacement effects are temporary, spatially limited, and subject to embedded environmental measures. Additionally, given the extent of available foraging resource within the wider agricultural landscape, the pink-footed goose population will continue to be a viable component of the SPA / Ramsar and sustained displacement or population-level effects as a result of Project activities at Scotstown landfall are unlikely.

8.5.1.3 For the Project in combination with other projects, no significant effects with respect to pink-footed geese were identified. Where pink-footed geese were recorded within a ZOI of other projects taken forward for assessment, embedded environmental measures are detailed in order to mitigate impact pathways throughout all phases of their lifespan. On this basis, alongside the embedded environmental measures of the Project, there is no potential for in-combination effects to occur with respect to pink-footed goose.

8.5.1.4 It is therefore concluded that the Project, alone and in-combination with other relevant projects, will not result in an AEoSI of the Loch of Strathbeg SPA / Ramsar, and that the COs for pink-footed geese will continue to be met.

Table 8.1 Conclusions of the assessment for AEoSI for all receptor groups

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
Marine mammals						
Moray Firth SAC	Bottlenose dolphin	UWN (auditory injury - piling).	No AEoSI	N/A	No AEoSI	N/A
		UWN (auditory injury - UXO clearance).	No AEoSI	N/A	No AEoSI	N/A
		UWN (auditory injury - pre-construction surveys).	No AEoSI	N/A	No AEoSI	N/A
		UWN (auditory injury - other construction activities).	No AEoSI	N/A	No AEoSI	N/A
		UWN (behavioural disturbance - piling).	No AEoSI	N/A	No AEoSI	No AEoSI
		UWN (behavioural disturbance - UXO clearance).	No AEoSI	N/A	No AEoSI	N/A
		UWN (behavioural disturbance - pre-construction activities).	No AEoSI	N/A	No AEoSI	No AEoSI
		UWN (behavioural disturbance - other construction activities).	No AEoSI	N/A	No AEoSI	No AEoSI

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
		UWN (operational noise from WTGs and cables).	N/A	No AEoSI	N/A	No AEoSI
		Vessel collision.	No AEoSI	No AEoSI	No AEoSI	N/A
		Vessel disturbance.	No AEoSI	No AEoSI	No AEoSI	No AEoSI
		Indirect effects on prey.	No AEoSI	No AEoSI	No AEoSI	N/A
		Entanglement.	N/A	No AEoSI	N/A	N/A
Offshore ornithology						
Buchan Ness to Collieston Coast SPA	Herring gull	Direct temporary habitat loss (offshore export cable corridor).	No AEoSI	N/A	No AEoSI	N/A
	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Collision risk.	N/A	No AEoSI	N/A	No AEoSI
		Direct temporary habitat loss (offshore export cable corridor).	No AEoSI	N/A	No AEoSI	N/A
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
	Guillemot	Distributional response effects.	N/A	No AEoSI	N/A	Potential for AEoSI

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
		Direct temporary habitat loss.	No AEoSI	N/A	No AEoSI	N/A
		Entanglement.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Direct temporary habitat loss.	No AEoSI	N/A	No AEoSI	N/A
	Shag	Direct temporary habitat loss.	No AEoSI	N/A	No AEoSI	N/A
Troup, Pennan and Lion's Heads SPA	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Collision risk.	N/A	No AEoSI	N/A	No AEoSI
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
	Guillemot	Distributional response effects.	N/A	No AEoSI	N/A	Potential for AEoSI
		Entanglement.	N/A	No AEoSI	N/A	N/A
	Razorbill	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Entanglement.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
Forth Islands SPA	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Collision risk.	N/A	No AEoSI	N/A	No AEoSI
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
	Razorbill	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Entanglement.	N/A	No AEoSI	N/A	N/A
	Puffin	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Entanglement.	N/A	No AEoSI	N/A	N/A
	Gannet	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Collision risk.	N/A	No AEoSI	N/A	No AEoSI
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Entanglement.	N/A	No AEoSI	N/A	N/A
Fowlsheugh SPA	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
		Collision risk.	N/A	No AEoSI	N/A	No AEoSI
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
	Razorbill	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Entanglement.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
East Caithness Cliffs SPA	Great black-backed gull	Collision risk.	N/A	No AEoSI	N/A	N/A
	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Collision risk.	N/A	No AEoSI	N/A	No AEoSI
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
	Razorbill	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Entanglement.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	**O**	**D**	
Copinsay SPA	Great black-backed gull	Collision risk.	N/A	No AEoSI	N/A	N/A
	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Collision risk.	N/A	No AEoSI	N/A	N/A
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	N/A
	Guillemot	Distributional response effects.	N/A	No AEoSI	N/A	Potential for AEoSI
		Entanglement.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
Fair Isle SPA	Great skua	Collision risk.	N/A	No AEoSI	N/A	N/A
	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Collision risk.	N/A	No AEoSI	N/A	N/A
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	N/A
	Guillemot	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
		Entanglement.	N/A	No AEoSI	N/A	N/A
	Razorbill	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Entanglement.	N/A	No AEoSI	N/A	N/A
	Puffin	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Entanglement.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
	Gannet	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Collision risk.	N/A	No AEoSI	N/A	No AEoSI
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Entanglement.	N/A	No AEoSI	N/A	N/A
Calf of Eday SPA	Great black-backed gull	Collision risk.	N/A	No AEoSI	N/A	N/A
	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	N/A

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
		Collision risk.	N/A	No AEoSI	N/A	N/A
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	N/A
	Guillemot	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Entanglement.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
West Westray SPA	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Collision risk.	N/A	No AEoSI	N/A	No AEoSI
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
	Razorbill	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Entanglement.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
North Caithness Cliffs SPA	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
		Collision risk.	N/A	No AEoSI	N/A	No AEoSI
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
	Razorbill	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Entanglement	N/A	No AEoSI	N/A	N/A
	Puffin	Distributional response effects	N/A	No AEoSI	N/A	No AEoSI
		Entanglement.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
Sule Skerry and Sule Stack SPA	Puffin	Entanglement.	N/A	No AEoSI	N/A	N/A
		Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
	Storm petrel	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Light pollution.	N/A	No AEoSI	N/A	N/A
		Collision risk.	N/A	No AEoSI	N/A	N/A
	Gannet	Entanglement.	N/A	No AEoSI	N/A	N/A

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	**O**	**D**	
		Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Collision risk.	N/A	No AEoSI	N/A	No AEoSI
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
Noss SPA	Puffin	Entanglement.	N/A	No AEoSI	N/A	N/A
		Distributional response effects.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
	Gannet	Entanglement.	N/A	No AEoSI	N/A	N/A
		Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Collision risk.	N/A	No AEoSI	N/A	No AEoSI
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
Foula SPA	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Collision risk.	N/A	No AEoSI	N/A	N/A

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	N/A
	Great skua	Collision risk.	N/A	No AEoSI	N/A	N/A
	Razorbill	Distributional response effects.	N/A	No AEoSI	N/A	N/A
	Puffin	Entanglement.	N/A	No AEoSI	N/A	N/A
		Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
	Leach's storm petrel	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Light pollution.	N/A	No AEoSI	N/A	N/A
		Collision risk.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
North Rona and Sula Sgeir SPA	Leach's storm petrel	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Light pollution.	N/A	No AEoSI	N/A	N/A
		Collision risk.	N/A	No AEoSI	N/A	N/A

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
	Gannet	Entanglement.	N/A	No AEoSI	N/A	N/A
		Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Collision risk.	N/A	No AEoSI	N/A	No AEoSI
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
Hermaness, Saxa Vord and Valla Field SPA	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Collision risk.	N/A	No AEoSI	N/A	N/A
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	N/A
	Great skua	Collision risk.	N/A	No AEoSI	N/A	N/A
	Puffin	Entanglement.	N/A	No AEoSI	N/A	N/A
		Distributional response effects.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
	Gannet	Entanglement.	N/A	No AEoSI	N/A	N/A
		Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Collision risk.	N/A	No AEoSI	N/A	No AEoSI
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
Hoy SPA	Great black-backed gull	Collision risk.	N/A	No AEoSI	N/A	N/A
	Great skua	Collision risk.	N/A	No AEoSI	N/A	N/A
	Puffin	Distributional response effects.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
Handa SPA	Great skua	Collision risk.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
Rousay SPA	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
Cape Wrath SPA	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	N/A

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
		Collision risk.	N/A	No AEoSI	N/A	N/A
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
Sumburgh Head SPA	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
The Shiant Isles SPA	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
Fetlar SPA	Great skua	Collision risk.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
Flannan Isles SPA	Leach's storm petrel	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Light pollution.	N/A	No AEoSI	N/A	N/A
		Collision risk.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
St Kilda SPA	Great skua	Collision risk.	N/A	No AEoSI	N/A	N/A

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
	Leach's storm petrel	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Light pollution.	N/A	No AEoSI	N/A	N/A
		Collision risk.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
	Manx shearwater	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Light pollution.	N/A	No AEoSI	N/A	N/A
		Collision risk.	N/A	No AEoSI	N/A	N/A
Mingulay and Berneray SPA	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
Marwick Head SPA	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Collision risk.	N/A	No AEoSI	N/A	N/A
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	N/A
Auskerry SPA	Storm petrel	Distributional response effects.	N/A	No AEoSI	N/A	N/A

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
		Light pollution.	N/A	No AEoSI	N/A	N/A
		Collision risk.	N/A	No AEoSI	N/A	N/A
Mousa SPA	Storm petrel	Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Light pollution.	N/A	No AEoSI	N/A	N/A
		Collision risk.	N/A	No AEoSI	N/A	N/A
St Abb's Head to Fast Castle SPA	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
		Collision risk.	N/A	No AEoSI	N/A	No AEoSI
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	No AEoSI
	Razorbill	Entanglement.	N/A	No AEoSI	N/A	N/A
		Distributional response effects.	N/A	No AEoSI	N/A	N/A
Farne Islands SPA	Puffin	Entanglement.	N/A	No AEoSI	N/A	N/A
		Distributional response effects.	N/A	No AEoSI	N/A	N/A
Flamborough and Filey Coast SPA	Kittiwake	Distributional response effects.	N/A	No AEoSI	N/A	N/A

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	O	D	
		Collision risk.	N/A	No AEoSI	N/A	N/A
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	N/A
	Razorbill	Entanglement.	N/A	No AEoSI	N/A	N/A
		Distributional response effects.	N/A	No AEoSI	N/A	N/A
	Fulmar	Distributional response effects.	N/A	No AEoSI	N/A	N/A
	Gannet	Entanglement.	N/A	No AEoSI	N/A	N/A
		Distributional response effects.	N/A	No AEoSI	N/A	N/A
		Collision risk.	N/A	No AEoSI	N/A	N/A
		Combined collision and distributional response effects.	N/A	No AEoSI	N/A	N/A
Intertidal ornithology						
Buchan Ness to Collieston Coast SPA	Guillemot	Direct temporary disturbance and displacement.	No AEoSI	N/A	No AEoSI	N/A
	Shag	Direct temporary disturbance and displacement.	No AEoSI	N/A	No AEoSI	N/A

Designated site	Feature(s) screened in	Potential for effect	Alone assessment			In-combination assessment
			C	**O**	**D**	
Ythan Estuary, Sands of Forvie and Meikle Loch SPA	Eider	Direct temporary disturbance and displacement.	No AEoSI	N/A	No AEoSI	N/A
Terrestrial ecology and ornithology						
Loch of Strathbeg SPA / Ramsar	Pink-footed goose	Land take / land cover change.	No AEoSI	No AEoSI	No AEoSI	No AEoSI
		Disturbance and displacement effects.	No AEoSI	No AEoSI	No AEoSI	No AEoSI

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10. Glossary and Abbreviations

10.1 Abbreviations

Acronym	Definition
μPa	micropascal
AA	Appropriate Assessment
AOD	Above Ordnance Datum
ADD	Acoustic Deterrent Device
AEoSI	Adverse Effect on Site Integrity
AHTS	Anchor Handling Tug Supply
AIS	Air Insulated Switchgear
BERR	Department for Business, Enterprise and Regulatory Reform
BDMPS	Biologically Defined Minimum Population Scales
BPP	Bird Protection Plan
BS	British Standard
BTO	British Trust for Ornithology
CI	Confidence Interval
CIBSE	Chartered Institute of Building Services Engineers
CoSA	Component of Seabird Assemblage
CoWA	Component of Waterbird Assemblage
CPGR	Counterfactual of Population Growth Rate
CPS	Counterfactual of Population Size
CRM	Collision Risk Modelling
cSAC	Candidate Special Area of Conservation
DAS	Digital Aerial Survey
dB	Decibels
DECC	Department of Energy and Climate Change
Defra	Department for the Environment, Food and Rural Affairs
DSV	Diving Support Vessels

Acronym	Definition
DVI	Disturbance Vulnerability Index
EC	European Commission
EDR	Effective Deterrent Range
EIA	Environmental Impact Assessment
EMF	Electromagnetic Fields
EMP	Environmental Management Plan
EN-3	National Policy Statement for Renewable Energy Infrastructure
EU	European Union
FCS	Favourable Conservation Status
FOC	Fibre Optic Cable
FOC JB	Fibre Optic Cable Joint Box
GIS	Gas Insulated Switchgear
GW	gigawatts
HDD	Horizontal directional drilling
HF	High Frequency
HRA	Habitats Regulations Appraisal
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
Hz	hertz
IAMMWG	Inter-Agency Marine Mammal Working Group
IBM	Individual based models
INNS	Invasive Non-Native Species
INSPIRE	Impulse Noise Sound Propagation and Impact Range Estimator
iPCoD	Interim Population Consequences of Disturbance
IROPI	Imperative Reasons of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
kg	kilograms
kHz	kilohertz

Acronym	Definition
kJ	kilojoules
km	kilometres
LAT	Lowest Astronomical Tide
LSE	Likely Significant Effect
m	metre
MBES	Multibeam Echo Sounders
mCRM	Migratory Collision Risk Modelling
MD-LOT	Marine Directorate Licensing and Operations
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMFR	Mean Maximum Foraging Range
MMMP	Marine Mammal Mitigation Protocol
MSL	Mean Sea Level
MU	Management Unit
MW	megawatts
NE7	Northeast 7 Plan Option
NESBReC	North East Scotland Biodiversity Record Centre
nm	nautical mile
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPF4	National Planning Framework 4
O&M	Operation and Maintenance
OAA	Option Agreement Area
OFTO	Offshore Transmission Operator
OPRED	Offshore Petroleum Regulator for Environment and Decommissioning
OOMP	Offshore Operations and Maintenance Plan
ORJIP	Offshore Renewables Joint Industry Programme
PEMP	Project Environmental Monitoring Programme

Acronym	Definition
PTS	Permanent Threshold Shift
PVA	Population Viability Analysis
RCP	Reactive Compensation Platforms
RIAA	Report to Inform Appropriate Assessment
RSPB	Royal Society for the Protection of Birds
s.36	Section 36
SAC	Special Area of Conservation
SBP	Sub-Bottom Profiler
SCANS	Small Cetacean in European Atlantic and North Sea
sCRM	Stochastic Collision Risk Model
SD	Standard Deviation
SDC	Subsea Distribution Centre
SEL	Sound Exposure Level
SHR	Shunt Reactor
SMP	Seabird Monitoring Programme
SMWWC	Scottish Marine Wildlife Watching Code
SNCB	Statutory Nature Conservation Body
SNH	Scottish Natural Heritage
SOC	Scottish Ornithologists' Club
SOV	Service Operation Vessel
SPA	Special Protection Area
SPL	Sound Pressure Level
SPR	ScottishPower Renewables
SSC	Suspended Sediment Concentrations
SSEN	Scottish and Southern Electricity Networks
SSS	Side-Scan Sonar
SSSI	Site of Special Scientific Interest
TTS	Temporary Threshold Shift

Acronym	Definition
UHRS	Ultra-High Resolution Seismic
UK	United Kingdom
USA	United States of America
USV	Uncrewed Surface Vessel
USBL	Ultra-Short Baseline Positioning System
UWN	Underwater Noise
UXO	Unexploded Ordnance
VP	Vantage Point
WeBS	Wetland Bird Survey
WTG	Wind Turbine Generator
ZOI	Zone of Influence

10.2 Glossary of terms

Term	Definition
Adverse Effect on Site Integrity	A significant effect that is assessed as undermining a site's conservation objectives.
Annex I (of the Habitats Directive)	Part of the Habitats Directive 92/43/EEC that identifies habitat types that require conservation through the designation of Special Areas of Conservation (SACs).
Annex II (of the Habitats Directive)	Part of the Habitats Directive 92/43/EEC that identifies species that require conservation through the designation of SACs.
Anthropogenic	Man-made
Appropriate Assessment	An assessment to determine the implications of a plan or project on relevant national site network sites in view of that site's conservation objectives. An Appropriate Assessment forms part of the Habitats Regulations Appraisal (HRA) and is required when a plan or project (either alone or in-combination with other plans or projects) is likely to have a significant effect on a national site network. Where there are adverse impacts, it also includes an assessment of the potential mitigation for those impacts.
Baseline	Existing conditions as represented by the latest available data, whether from literature or survey and used as a benchmark for making comparisons to assess the impact of a development or project.
Baseline conditions	The environment as it appears (or would appear) immediately prior to

Term	Definition
	the implementation of a project, together with any known or foreseeable future changes that will take place before its completion.
Bathymetry	Topography of sea or estuary bed as measured from a fixed vertical datum.
Benthic ecology	The study of the organisms living in and on the sea floor, the interactions between them and their impacts on the surrounding environment.
Collision	Contact between two or more bodies (*e.g.* vessels, animals).
Conservation Objective	An objective set for each qualifying feature of a site. One of the key purpose is to provide a benchmark against which plans and projects are assessed.
Construction effects	Used to describe both temporary effects that arise during the construction stage as well as permanent existence effects that arise from the physical existence of development (for example new buildings).
Cumulative Effects	Additional changes caused by the Project in conjunction with other similar developments or as a combined effect of a set of developments, taken together.
Construction Environmental Management Plan	A plan that sets out the standards and procedures to which developers and contractors must adhere when undertaking construction of major projects. This will assist with managing the environmental impacts and will identify the main responsibilities and requirements of developers and contractors.
Cumulative Effects Assessment	Assessment of effects as a result of the incremental changes caused by other past, present and reasonably foreseeable human activities and natural processes together with the Project.
Decibels (dB)	A unit used to measure the intensity of a sound or the power level of an electrical signal by comparing it with a given level on a logarithmic scale.
Decommissioning	The period during which a development and its associated processes are removed from active operation.
Department for Business Energy and Industrial Strategy	The Government department responsible for business; industrial strategy; science; research and innovation; energy and clean growth; and climate change.
Derogation	The process of exempting certain regulations from compliance under specific circumstances. Specifically in the context of HRA, it refers to provisions that allow certain plans or projects to proceed despite potential adverse effects on designated sites in the National Site Network.
Digital Aerial Surveys	Digital surveys carried out by aeroplane.
Direct effects	Those effects that result directly from the Project, *i.e.* effects that are made directly to a receptor. An example would habitat loss as a result of clearance activities during construction.
Echolocation	The location of objects by reflected sound.

Term	Definition
Effect	An effect is the consequence of an impact when considered in combination with the receptor's sensitivity / value / importance, defined in terms of significance.
Electromagnetic field	An electric and magnetic force field that surrounds a moving electrical charge.
Embedded environmental measures	Equate to 'primary environmental measures' as defined by Institute of Environmental Management and Assessment (2016). They are measures to avoid or reduce environmental effects that are directly incorporated into the preferred masterplan for the Project.
Embedded mitigation	Mitigation measures included in the Project design.
Environmental Impact Assessment	The process of evaluating the likely significant environmental effects of a proposed project or development over and above the existing circumstances (or 'baseline').
Environmental Impact Assessment Report	The outcome of the Environmental Impact Assessment (EIA) process is reported within a document called an EIA Report.
Environmental Measures	Measures that are proposed to prevent, reduce and where possible offset any significant adverse effects (or to avoid, reduce and if possible, remedy identified effects).
European Commission	The European Union's (EU's) politically independent executive division. It is responsible for preparing proposals for new European legislation, and it implements the decisions of the European Parliament and the Council of the EU.
European Protected Species	Species of plants and animals (other than birds) protected by law throughout the European Union.
European site	European sites are those that are designated through the Habitats Directive and Birds Directive (via national legislation as appropriate). Within Scotland, additional sites designated through international convention are given the same protection through policy – overall all of these are referred to as European sites. European sites in Scotland are considered to be SPAs, SACs, candidate SACs and Sites of Community Importance (SCI). Potential SPAs (pSPA), possible SACs (pSACs), Ramsar sites (designated under international convention) and proposed Ramsar sites.
Exclusive Economic Zone	An area of coastal water and seabed out to a maximum of 200nm from a country's coastline, to which the country claims exclusive rights for fishing, resource extraction and other economic activities.
Export Cable Corridor	The broad linear area through seabed (seaward of Mean High Water Springs (MHWS)) and land (landward of MHWS) connecting the Project OAA offshore to the proposed substation onshore, and within which electrical export cables will be located.
Geophysical survey	Activities to obtain data on the distribution and nature of geophysical properties of the seabed (e.g. bathymetry, surficial sediment type and bedforms, sub surface geology). Geophysical survey outputs typically

Term	Definition
	include multibeam bathymetry, side scan sonar and sub bottom profiler data.
Gigawatt	A unit of electrical power equivalent to one billion Watts.
Habitats Regulation Appraisal	The assessment of the impacts of implementing a plan or policy on a European Site, the purpose being to consider the impacts of a project against conservation objectives of the site and to ascertain whether it would adversely affect the integrity of the site.
Habitats Regulations	The Habitats Directive (Directive 92/43/ECC) and the Birds Directive (Directive 2009/147/EC) were transposed into Scottish Law by the Conservation (Natural Habitats &c) Regulations 1994 (‘Habitats Regulations’) (up to 12 nm); by the Conservation of Offshore Marine Habitats and Species Regulations 2017 (‘Offshore Marine Regulations’) (beyond 12 nm); the Conservation of Habitats and Species Regulations 2017 (of relevance to consents under Section 36 of the Electricity Act 1989); the Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001; and the Wildlife and Countryside Act 1981. The Habitats Regulations set out the stages of the Habitats Regulations Appraisal (HRA) process required to assess the potential impacts of a proposed project on European Sites (Special Areas of Conservation, Special Protection Areas, candidate SACs and SPAs and Ramsar Sites).
Horizontal directional drilling	An engineering technique for laying cables that avoids open trenches by drilling between two locations beneath the ground's surface.
Hertz (Hz)	The unit of measurement for frequency of a sound wave, measured as the number of sound waves oscillating per second.
Impact	The changes resulting from an action.
Impact pathway	A change descriptively assessed by one aspect, used by another aspect to inform a related assessment.
In-combination effects	Effects resulting from the combined impacts of the Project with other projects / plans on European Conservation Sites. These will be presented separately within HRA-related documentation.
Indirect effects and secondary effects	Those effects that are not caused immediately by the Project but arise as a consequence of it. An example would be where indirect employment is created as suppliers increase their activities and hire new workers to provide the additional goods and services required by the Project.
Imperative Reasons of Overriding Public Interest	Reasons that relate to human health, public safety, beneficial consequences of primary importance to the environment, or any other imperative reason of overriding public interest subject to the opinion of the Scottish Ministers.
Joint Nature Conservation Committee	The public body that advises the UK Government and devolved administrations on UK-wide and international nature conservation.
Landfall(s)	The generic term applied to the entire coastal area between the limit of MLWS and the position of the Transition Joint Bay (TJB) located above

Term	Definition
	the limit of MHWS, inclusive of all construction works, including the offshore and onshore export cable corridor, intertidal working area and landfall compound.
Likely Significant Effect	An effect to a European site that has the potential to undermine the conservation objectives.
Magnitude (of change)	A term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short-term or long-term in duration'. Also known as the 'degree' or 'nature' of change.
Marine Directorate – Licencing Operations Team	The regulator for determining marine licence applications on behalf of the Scottish Ministers in the Scottish inshore region (between 0 and 12 nautical miles) under the Marine (Scotland) Act 2010, and in the Scottish offshore region (between 12 and 200 nautical miles) under the Marine and Coastal Access Act 2009.
Marine licence	Licence required for certain activities in the marine environment and granted under either the Marine and Coastal Access Act 2009 or the Marine (Scotland) Act 2010.
Marine Mammal Mitigation Protocol	A programme of measures to minimise the risk of injury (in the form of a permanent change in hearing referred to as a permanent threshold shift, or PTS) in marine mammals.
Marine Directorate	Civil service directorate for Scotland, which is responsible for the integrated management of Scotland's seas.
MarramWind Limited ('the Applicant')	MarramWind Offshore Wind Farm (hereafter referred to as 'the Project') is wholly owned by ScottishPower Renewables UK Limited (SPR). MarramWind Limited, a subsidiary of SPR, is the Applicant for the Project.
Mean (average)	The arithmetic average of a set of numbers, *e.g.* add up the numbers and divide by the number of numbers
Mean High Water Springs	The average throughout a year of the heights of two successive high waters during those periods of 24 hours (approximately once a fortnight) when the tidal range is greatest.
Mean Low Water Springs	The average throughout a year of the heights of two successive low waters during those periods of 24-hours (approximately once a fortnight) when the tidal range is greatest.
Megawatts	Unit of electrical power equal to one million Watts.
Metre	Unit of lateral measurement equivalent to 100 centimetres.
Mitigation	Any action or process designed to avoid, prevent, reduce or, if possible, offset potentially significant adverse effects of a development.
Natura 2000	A pan-European network of habitats identified and protected for the presence of rare and threatened habitats and/or species as designated by Annex I or Annex II (respectively) of the Habitats Directive.

Term	**Definition**
Natural England	A Government advisory body responsible for protecting and enhancing England's natural environment.
NatureScot	Formerly known as Scottish Natural Heritage, NatureScot is a public body and government advisor responsible for Scotland's natural heritage, in particular for its natural, genetic and scenic diversity.
Nautical mile	A unit used in measuring distances at sea, equal to 1,852 metres.
Offshore	Pertaining to the seaward side of MLWS, and typically in reference to locations some distance from the coast.
Offshore Wind Farm	An offshore wind farm is a group of wind turbine generators in the same location (offshore) in the sea, which are used to produce electricity.
Option Agreement	An agreement between two parties (the Crown Estate Scotland and the offshore wind farm developer in this case) to facilitate a future possible transaction concerning an asset at an agree price and on an agreed date.
Option Agreement Area	Term for the wind farm site upon the seabed at a location specified in the Option Agreement between the Crown Estate Scotland and a developer. It is the agreement that allows the developer the rights to undertake such tests, survey and site investigations that do not entail the temporary or permanent installation of any works or structures on the seabed.
Planning Permission	Planning permission granted under the Town and Country Planning (Scotland) Act 1997 for all Project infrastructure located landward of the Mean Low Water Springs (MLWS).
Permanent Threshold Shift	Irreversible and permanent hearing loss.
Project Description	Chapter 2 of the Scoping Report that describes key parameters of the MarramWind Project infrastructure, including materials and installation methods. It includes optionality in relation to some design parameters where the design evolution of the Project is ongoing.
Project Option Agreement Area	Term for the wind farm site upon the seabed at a location specified in the Option Agreement between the Crown Estate Scotland and a developer. It is the agreement that allows the developer the rights to undertake such tests, survey and site investigations that do not entail the temporary or permanent installation of any works or structures on the seabed.
Qualifying Feature	Habitats, species or assemblages that are protected under the Habitats Regulations and are designated as SACS and SPAs.
Ramsar Convention	Convention on Wetlands of International Importance 1972
Ramsar Site	Areas listed by the UK Government under the Convention on Wetlands of International Importance (the Ramsar Convention 1971).
Receptor	This term originates as defined in Regulation 5(2) of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and include population and human health, biodiversity, land, soil, water, air,

Term	Definition
	climate, material assets, cultural heritage and landscape that may be at risk from exposure to pollutants which could potentially arise as a result of the Project. It is equivalent to the term 'factors' defined in 4(3) of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, where factors may be subject to significant effects of the Project and include population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and the landscape.
Report to Inform Appropriate Assessment	A report submitted by an applicant for a project to provide information to enable Scottish Ministers to undertake a Habitats Regulations Appraisal (HRA).
Rochdale Approach	The Rochdale Approach is a parameter-based approach to environmental assessment that aims to take account of the need for flexibility in the evolution of detailed design.
Root mean square	Root Mean Square of a time varying quantity is obtained by squaring the amplitude at each instant, obtaining the average of the squared values over the interval of interest, and then taking the Square Root of this average.
Scottish Ministers	The devolved government of Scotland.
ScottishPower Renewables UK Limited	Part of the Iberdrola group and 100% owner of MarramWind Limited.
Significance	A measure of the importance of the environmental effect, defined by criteria specific to the environmental aspect.
Small cetaceans in European Atlantic Waters and the North Sea	The name of a scientific research endeavour that involved large-scale ship and aerial surveys of the distribution and abundance of cetaceans in European Atlantic waters. The survey was first undertaken in 1994, with similar surveys also conducted in 2005, 2007, 2016 and 2022.
Sound Exposure Level	A logarithmic measure of the total sound energy of a sound event relative to a reference value. Measured in decibels (dB) to a given reference pressure level and time period.
Sound pressure level	Sound pressure level is the RMS value of the Instantaneous Sound Pressures measured over a specified period of time, measured in decibels (dB) to a given reference pressure level.
Special Area of Conservation	International designation implemented under the Habitats Regulations for the protection of habitats and (non-bird) species. Sites designated to protect habitats and species in Annexes I and II of the Habitats Directive and sufficient habitat to be conserved to maintain favourable conservation status of designated features.
Stakeholder	Person or organisation with a specific interest (commercial, professional or personal) in a particular issue.
Study area	Area where potential impacts from the Project could occur, as defined for each aspect.

Term	Definition
Suspended sediment concentration	The mass concentration (mass/ volume) of sediment in suspension.
Temporary or permanent effects	Effects may be considered as temporary or permanent within a timeframe of relevance to the aspect or receptor in question.
Temporary Threshold Shift	Reversible and temporary hearing loss.
The Crown Estate Scotland	The public corporation of the Scottish government that is responsible for the management of land and property in Scotland, as owned by the monarch "*in right of the Crown*".
The Project	MarramWind Offshore Wind Farm Project that is the subject of this RIAA, as described in Chapter 2.
Type or Nature of effect	Whether an effect is direct or indirect, temporary, long-term or permanent, positive (beneficial), neutral or negative (adverse) or cumulative.
Unexploded Ordnance	Explosive weapons (e.g. bombs, shells, grenades, land mines, naval mines) that did not explode when they were employed or discarded and still pose a risk of detonation, potentially many decades later.
United Kingdom	The United Kingdom of Great Britain and Northern Ireland, comprising England, Scotland, Wales and Northern Ireland.

Appendix A
Screening Assessment Table

Table A1 HRA Screening Assessment

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
Moray Firth SAC	Bottlenose dolphin	Disturbance and displacement from underwater noise; collision risk with vessels; barrier effects; indirect impacts due to effects on prey species and habitats; and in-combination effects with other Projects under development within and surrounding the Moray Firth.	Coastal East Scotland MU	No direct overlap with SAC but may have connectivity with the qualifying feature species of this Designated site.	Potential effects (indicated in potential effect pathway to LSE column) cannot be screened out at this stage and therefore there is a potential for LSE on this resident population of bottlenose dolphins. This population is relatively small 224 (95% CI = 214-234), which is a factor in screening this qualifying feature into the assessment.	Yes
Buchan Ness to Collieston Coast SPA	Seabird assemblage	Offshore: Direct temporary habitat loss; distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Offshore: LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage qualifying feature.	Yes
		Intertidal: Direct temporary habitat loss; direct	Intertidal: Criteria 1, 2 and 3 (breeding season).		Intertidal: LSE has been concluded for components of the	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
		temporary disturbance and displacement, in-combination.			seabird assemblage. Therefore, LSE concluded for the seabird assemblage qualifying feature.	
	Kittiwake (Component of seabird assemblage (CoSA))	Offshore: Direct temporary habitat loss; distributional responses; collision risk; In-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Offshore: Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Herring gull (CoSA)	Offshore: Direct temporary habitat loss; collision risk; in-combination.	Offshore: Criterion 1 (ECC only) and 2 (non-breeding season only).		Offshore: Connectivity to the Project and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season.	Yes
		Intertidal: Direct temporary habitat loss; direct temporary disturbance and displacement.	Intertidal: Criteria 1, 2 and 3 (breeding season).		Intertidal: Important SPA numbers recorded during intertidal bird surveys. Screened in due to overlap of Landfall Zone Sandford Bay with SPA boundary. LSE	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					identified during the breeding season.	
	Guillemot (CoSA)	Offshore: Direct temporary habitat loss; distributional responses; entanglement; in-combination.	Offshore: Criterion 1 (ECC only) and 2 (breeding and non-breeding season).		Offshore: Connectivity to the Project and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
		Intertidal: Direct temporary disturbance and displacement; in-combination.	Intertidal: Criteria 1, 2 and 3 (breeding season).		Intertidal: Feature recorded in important numbers within the nearshore environment, therefore potential for a LSE in the breeding season due to sensitivity to disturbance.	Yes
	Fulmar (CoSA)	Offshore: Direct temporary habitat loss.	Offshore: Criterion 1 (ECC only) and 2 (breeding and non-breeding season).		Offshore: Connectivity and sensitivity to impact pathway identified in the offshore ECC. Potential for LSE concluded in the breeding season	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
	Shag (CoSA)	Offshore: Direct temporary habitat loss.	Offshore: Criterion 1 (ECC only).		Offshore: Connectivity and sensitivity to impact pathway identified in the offshore ECC. Potential for LSE concluded in the breeding season.	Yes
		Intertidal: Direct temporary disturbance and displacement; in-combination.	Intertidal: Criteria 1, 2 and 3 (breeding season).		Intertidal: Feature recorded in important numbers within the nearshore environment, therefore potential for a LSE in the breeding season due to sensitivity to disturbance.	Yes
Loch of Strathbeg SPA / Ramsar	Svalbard barnacle goose (non-breeding)	Offshore: Collision risk; In-combination.	Offshore: Criterion 2 (non-breeding season only).		Offshore: Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Pink-footed goose (non-breeding)	Onshore: Disturbance and displacement; In-combination.	Onshore: Criterion 3 (non-breeding season only).		Onshore: Connectivity to the onshore land with potential functional linkage to Loch of	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					Strathbeg SPA / Ramsar and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season.	
	Waterfowl assemblage (non-breeding)	Offshore: Collision risk.	Offshore: Criterion 2 (non-breeding season only).		Offshore: LSE identified for components of the waterbird assemblage. Therefore, potential for LSE in the non-breeding season.	Yes
		Onshore: Disturbance and displacement; In-combination.	Onshore: Criterion 3 (non-breeding season only).		Onshore: LSE identified for component of the waterbird assemblage (pink-footed goose). Therefore, potential for LSE in the non-breeding season.	Yes
	Teal (Component of waterbird assemblage (CoWA))	Offshore: Collision risk.	Offshore: Criterion 2 (non-breeding season only).		Offshore: Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					for LSE in the non-breeding season.	
	Goldeneye (CoWA)	Offshore: Collision risk.	Offshore: Criterion 2 (non-breeding season only).		Offshore: Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
Troup, Pennan and Lion's Head SPA	Guillemot	Offshore: Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding seasons).		Offshore: Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding seasons.	Yes
	Seabird assemblage (breeding)	Offshore: Distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (breeding season only).		Offshore: LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes
	Kittiwake (CoSA)	Offshore: Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding seasons).		Offshore: Connectivity to the Project OAA and species sensitivity to	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					impact pathways identified. Potential for LSE during the non-breeding seasons.	
	Herring gull (CoSA)	Offshore: Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Offshore: Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding seasons.	Yes
	Razorbill (CoSA)	Offshore: Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding seasons).		Offshore: Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding seasons.	Yes
Ythan Estuary, Sands of Forvie and Meikle Loch SPA	Pink-footed goose	Onshore: Disturbance and displacement; In-combination.	Onshore: Criterion 3 (Non-breeding).		Onshore: Connectivity to the onshore land with potential functional linkage to Ythan Estuary, Sands of Forvie and Meikle Loch SPA and species sensitivity to	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					impact pathways identified. Potential for LSE during the non-breeding season.	
	Waterbird assemblage (non-breeding)	Offshore: Collision risk.	Offshore: Criterion 2 (non-breeding season only).		Offshore: Potential for LSE identified for components of the waterbird assemblage. Therefore, potential for LSE concluded for the waterbird assemblage.	Yes
		Intertidal: Direct temporary habitat loss; direct temporary disturbance and displacement; in-combination.	Intertidal: Criteria 2 and 3 (non-breeding season).		Intertidal: Potential for LSE identified for components of the waterbird assemblage. Therefore, potential for LSE concluded for the waterbird assemblage.	Yes
		Onshore: No LSE.	Onshore: No LSE.		Onshore: Features not recorded within onshore environment and no connectivity between joining bay and intertidal area, therefore no pathway for effect.	No

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
	Eider (CoWA)	Intertidal: Direct temporary disturbance and displacement; in-combination.	Intertidal: Criteria 2 and 3 (non-breeding season).		Intertidal: Important numbers of eider recorded at Landfall Zones Lunderton and Sandford Bay. Potential for LSE in the non-breeding season.	Yes
	Lapwing (CoWA)	Offshore: Collision risk.	Offshore: Criterion 2 (non-breeding season).		Offshore: Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Redshank (CoWA)	Offshore: No connectivity.	Offshore: Criterion 2 (non-breeding season).		Offshore: Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
Moray Firth SPA	Great northern diver	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					identified. Potential for LSE in the non-breeding season.	
	Slavonian grebe	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Long-tailed duck	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Common scoter	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
	Velvet scoter	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Goldeneye	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Red-breasted merganser	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Goldeneye	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					impact pathways identified. Potential for LSE in the non-breeding season.	
	Goosander	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
Fowlsheugh SPA	Kittiwake	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding seasons).		Potential for connectivity to Project OAA and species sensitivity to impact pathways identified. Potential for LSE.	Yes
	Seabird assemblage (breeding)	Distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (breeding season only).		Potential for connectivity to Project OAA and species sensitivity to impact pathways identified. Potential for LSE.	Yes
	Herring gull (CoSA)	Collision risk; In-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA and species sensitivity to	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					impact pathways identified. Potential for LSE.	
	Razorbill (CoSA)	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA and species sensitivity to impact pathways identified. Potential for LSE.	Yes
East Caithness Cliffs SPA	Kittiwake	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Herring gull	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season.	Yes
	Razorbill	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					identified. Potential for LSE during the non-breeding seasons.	
	Seabird assemblage	Distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes
	Great black-backed gull (CoSA)	Collision risk; In-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season.	Yes
North Caithness Cliffs SPA	Seabird assemblage	Distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes
	Kittiwake (CoSA)	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					for LSE during both the breeding and non-breeding seasons.	
	Razorbill (CoSA)	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding seasons.	Yes
	Puffin (CoSA)	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
Moray and Nairn Coast SPA	Bar-tailed godwit (non-breeding)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
	Red-breasted merganser (non-breeding)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Wigeon (non-breeding)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Redshank (non-breeding)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Dunlin (non-breeding)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					impact pathways identified. Potential for LSE in the non-breeding season.	
	Oystercatcher (non-breeding)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Waterbird assemblage (non-breeding)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for LSE identified for components of the waterbird assemblage. Therefore, potential for LSE concluded for the waterbird assemblage.	Yes
Dornoch Firth and Loch Fleet SPA	Bar-tailed godwit	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
	Wigeon	Collision risk; In-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Waterbird assemblage (non-breeding)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for LSE identified for components of the waterbird assemblage. Therefore, potential for LSE concluded for the waterbird assemblage.	Yes
	Teal (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Curlew (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					impact pathways identified. Potential for LSE in the non-breeding season.	
	Redshank (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Dunlin (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Oystercatcher (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
Inner Moray Firth SPA	Red-breasted merganser	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Bar-tailed godwit	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Redshank	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Waterbird assemblage (non-breeding)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for LSE identified for components of the waterbird assemblage.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					Therefore, potential for LSE concluded for the waterbird assemblage.	
	Teal (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Wigeon (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Goldeneye (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
	Goosander (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Curlew (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Oystercatcher (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
Cromarty Firth SPA	Bar-tailed godwit	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					impact pathways identified. Potential for LSE in the non-breeding season.	
	Waterbird assemblage (non-breeding)	Collision risk.	Offshore: Criterion 2 (non-breeding season only).		Potential for LSE identified for components of the waterbird assemblage. Therefore, potential for LSE concluded for the waterbird assemblage.	Yes
	Red-breasted merganser (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Pintail (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
	Wigeon (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Redshank (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Curlew	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
	Oystercatcher (CoWA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					impact pathways identified. Potential for LSE in the non-breeding season.	
	Dunlin (CoWA)	Collision risk.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
Loch Ashie SPA	Common scoter	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration considered highly limited based on known broad migratory front, especially considering the limited number of individuals.	Yes
	Wigeon	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration considered highly limited based on known broad migratory front, especially	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					considering the limited number of individuals.	
	Greenshank	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Potential for connectivity to Project OAA on migration and species sensitivity to impact pathways identified. Potential for LSE in the non-breeding season.	Yes
Forth Islands SPA	Gannet	Distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Puffin	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
	Seabird assemblage	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes
	Kittiwake (CoSA)	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Herring gull (CoSA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season only.	Yes
	Razorbill (CoSA)	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season only.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
Copinsay SPA	Seabird assemblage	Distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes
	Kittiwake (CoSA)	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Great black-backed gull (CoSA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season.	Yes
Hoy SPA	Great skua	Collision risk; in-combination.	Offshore: Criterion 2 (breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the breeding season.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
	Seabird assemblage	Distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes
	Kittiwake (CoSA)	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Great black-backed gull (CoSA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season only.	Yes
St. Abb’s Head to Fast Castle SPA	Seabird assemblage	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
	Kittiwake (CoSA)	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season.	Yes
	Herring gull (CoSA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season.	Yes
	Razorbill (CoSA)	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season.	Yes
Fair Isle SPA	Guillemot	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					non-breeding seasons.	
	Seabird assemblage	Distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes
	Kittiwake (CoSA)	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Herring gull (CoSA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season.	Yes
	Great skua (CoSA)	Collision risk; in-combination.	Offshore: Criterion 2 (breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					for LSE during the breeding season.	
	Razorbill (CoSA)	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Puffin (CoSA)	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Gannet (CoSA)	Distributional responses; collision risk; entanglement in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
Calf of Eday SPA	Seabird assemblage	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes
	Kittiwake (CoSA)	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Great black-backed gull (CoSA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season only.	Yes
Rousay SPA	Seabird assemblage	Distributional responses; Collision risk; In-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
	Kittiwake (CoSA)	Distributional responses; Collision risk; In-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
Marwick Head SPA	Seabird assemblage	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes
	Kittiwake (CoSA)	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
West Westray SPA	Seabird assemblage	Distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
	Kittiwake (CoSA)	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Razorbill (CoSA)	Distributional responses; Entanglement In-combination.	Offshore: Criterion 2 (non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season only.	Yes
Farne Islands SPA	Seabird assemblage	Distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes
	Kittiwake (CoSA)	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					non-breeding seasons.	
	Puffin (CoSA)	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season only.	Yes
Sumburgh Head SPA	Seabird assemblage	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes
	Kittiwake (CoSA)	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
Handa SPA	Seabird assemblage	Collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					concluded for the seabird assemblage.	
	Kittiwake (CoSA)	Collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Great skua (CoSA)	Collision risk; In-combination.	Offshore: Criterion 2 (breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the breeding season only.	Yes
Sule Skerry and Sule Stack SPA	Puffin	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the breeding season only.	Yes
	Seabird assemblage	Distributional responses; in-combination.	Offshore: Criterion 2 (breeding season only).		LSE has been concluded for components of the seabird assemblage.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					Therefore, LSE concluded for the seabird assemblage.	
Noss SPA	Great skua	Collision risk; in-combination.	Offshore: Criterion 2 (breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the breeding season.	Yes
	Gannet	Distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Seabird assemblage	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes
	Kittiwake (CoSA)	Distributional responses; collision risk; in-combination	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					for LSE during both the breeding and non-breeding seasons.	
	Puffin (CoSA)	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
Foula SPA	Great skua	Collision risk; in-combination.	Offshore: 2 (breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the breeding season only.	Yes
	Puffin	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
	Seabird assemblage	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes
	Kittiwake (CoSA)	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Razorbill (CoSA)	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season only.	Yes
Fetlar SPA	Great skua	Collision risk with turbines; in-combination.	Offshore: Criterion 2 (breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the breeding season only.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
Hermaness, Saxa Vord and Valla Field SPA	Great skua	Collision risk; in-combination.	Offshore: Criterion 2 (breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the breeding season only.	Yes
	Puffin	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season only.	Yes
	Gannet	Distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
	Seabird assemblage	Distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
	Kittiwake (CoSA)	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (breeding and non-breeding season).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during both the breeding and non-breeding seasons.	Yes
Flamborough and Filey Coast SPA	Kittiwake	Distributional responses; collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season only.	Yes
	Razorbill	Distributional responses; entanglement; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season only.	Yes
	Gannet	Distributional responses; collision; entanglement; in-combination.	Offshore: Criterion 2 (non-breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					non-breeding season only.	
	Seabird assemblage	Distributional responses; collision risk; entanglement; in-combination.	Offshore: Criterion 2 (non-breeding season only).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE concluded for the seabird assemblage.	Yes
	Herring gull (CoSA)	Collision risk; in-combination.	Offshore: Criterion 2 (non-breeding season only). Criterion 4.		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the non-breeding season only.	Yes
St Kilda SPA	Great skua	Collision risk; in-combination.	Offshore: Criterion 2 (breeding season only).		Connectivity to the Project OAA and species sensitivity to impact pathways identified. Potential for LSE during the breeding season only.	Yes
	Seabird assemblage	Collision risk.	Offshore: Criterion 2 (breeding season only).		LSE has been concluded for components of the seabird assemblage. Therefore, LSE	Yes

Designated site	Qualifying feature(s)	Potential effect pathway to LSE	Zone of Influence	Designated site overlap with ZOI	Screening rationale	Potential for LSE
					concluded for the seabird assemblage.	

Appendix B
Commitments Register

Table B1 Embedded environmental measures - RIAA

ID	Environmental measure proposed	Project stage measure introduced	How the environmental measures will be secured	Relevant technical aspect
M-001	Underground cables will be used to connect from the landfall(s) transition joint bays to the onshore substations. An additional section of the onshore export cable corridor will run from the onshore substations to the grid connection point at SSEN Netherton Hub. Cables are typically installed in ducts in a standard buried trench arrangement with appropriate insulation, providing protection from temperature extremes and changes in soil moisture.	Scoping Amended at EIA Report.	**Volume 4: Outline Construction Environmental Management Plan** and planning conditions.	Terrestrial ecology and ornithology
M-002	Sensitive sites will be avoided by the temporary and permanent onshore project footprint including SPAs, SACs, SSSIs, National Nature Reserve (NNR), Local Nature Reserves, Local Wildlife Sites, Ancient woodland, areas of consented development, areas of historic landfill and other known areas of potential contamination, Scottish National Trust land, listed buildings and scheduled monuments, potable water supply abstractions, floodplains and geomorphic risk areas.	Scoping Amended at EIA Report.	**Volume 4: Outline Construction Environmental Management Plan**, description of Project and planning conditions.	Terrestrial ecology and ornithology
M-005	To reduce the environmental impact of the landfall(s), a trenchless solution is to be implemented to install ducts. Determination of the most suitable trenchless landfall crossing method will be undertaken during the detailed design stage of the Project, following geotechnical investigation of the onshore and nearshore areas.	Scoping Amended at EIA Report.	**Volume 4: Outline Construction Environmental Management Plan**, description of Project and planning conditions.	Terrestrial ecology and ornithology
M-006	Vegetation (trees / woodland / hedgerows) Vegetation will be retained where possible as detailed in **Volume 3, Appendix 23.10: Arboricultural Impact Assessment** and	Scoping Amended at EIA Report.	**Volume 4: Outline Construction Environmental Management Plan**, description of Project	Terrestrial ecology and ornithology

ID	Environmental measure proposed	Project stage measure introduced	How the environmental measures will be secured	Relevant technical aspect
	Volume 3, Appendix 23.10, Figure 1 Tree Removal and Protection Plan of the **EIA Report**. Otherwise, vegetation removal will be undertaken in line with British Standard (BS) 5837-2012 (Trees in relation to design, demolition and construction) and scheduled to avoid bird breeding seasons. Ancient woodland will be retained with a stand-off of a minimum of 25m from any surface construction works (HDD (or similar trenchless technique)) a depth >6m). With regards to other woodland / forestry, the onshore export cable construction corridor will be reduced, where practical, to minimise tree loss and where the construction corridor passes close to woodland that is being retained, BS5837:2012 root protection to apply. Hedgerows with trees / tree lines which are crossed by the onshore export cable corridor will be notched to reduce landscape impacts. All hedgerows that are to be retained, coppiced, notched (vegetation removed only where trenching occurs) or lost are to be mapped. Vegetation may be coppiced / pruned to allow access and visibility splays at junctions.		and planning conditions.	
M-009	Areas of temporary habitat loss will be reinstated, wherever practicable, following the completion of construction in each area. Wherever possible, reinstatement will be back to the type of habitat crossed.	Scoping	**Volume 4: Outline Construction Environmental Management Plan**, description of Project and planning conditions.	Terrestrial ecology and ornithology
M-011	A lighting design of all temporary and permanent lighting will be developed once contractors are appointed; however, the joint guidance provided by the Bat Conservation Trust and Institution of	Scoping Amended at EIA Report.	**Volume 4: Outline Construction Environmental**	Terrestrial ecology and ornithology

ID	Environmental measure proposed	Project stage measure introduced	How the environmental measures will be secured	Relevant technical aspect
	Lighting Professionals (2023). The lighting design will account of the potential effects on terrestrial ecology and people (residents) by taking measures to minimise lighting usage, minimise light spill, use most appropriate wave lengths of light and locate lighting in the most appropriate locations – this is to decrease the potential displacement effects on light sensitive fauna, such as bats.		**Management Plan**, description of Project and planning conditions.	
M-012	Speed limits (of no greater than 15 miles per hour (mph)) will be imposed on all construction haul roads and access tracks to minimise the risk of road traffic collisions with fauna such as badgers, otters, bats and barn owls.	Scoping Amended at EIA Report.	**Volume 4: Outline Construction Environmental Management Plan**, description of Project and planning conditions.	Terrestrial ecology and ornithology
M-027	At any sensitive features identified along the route, the working width of the temporary construction corridor will be reduced as far as practicable to avoid or minimise potential environmental effects. Where it is necessary to cross sensitive features, such as watercourses and woodland, trenchless construction methods will be used to install ducts under the crossed feature, which the onshore export cables are then pulled through via entry and exit pits.	Scoping Amended at EIA Report.	**Volume 4: Outline Construction Environmental Management Plan**, description of Project and planning conditions.	Terrestrial ecology and ornithology
M-028	An **Outline Scour Protection Plan** has been submitted within this Application (**Volume 4** of the **EIA Report**), and includes details of the need, type, quantity and installation methods for scour protection. A Final Scour Protection Plan will be completed prior to construction commencing and will include measures during the O&M stage such as periodic inspection and maintenance requirements and will be submitted to MD-LOT for approval.	Scoping Amended at EIA Report.	s.36 conditions and marine licences conditions.	Marine mammals
M-032	An **Outline Marine Mammal Mitigation Protocol** (MMMP) has been submitted with this Application (**Volume 4** of the **EIA Report**). The Final MMMP will be completed prior to construction and submitted to	Scoping Amended at EIA Report.	s.36 conditions and marine licences conditions.	Marine mammals

ID	Environmental measure proposed	Project stage measure introduced	How the environmental measures will be secured	Relevant technical aspect
	MD-LOT for approval. The MMMP will be adhered to and subsequently mitigate potential impacts from underwater noise on marine mammals and fish through good or standard practice actions in order to meet legislative requirements.			
M-033	An **Outline Marine Pollution Contingency Plan** (MPCP) (Appendix to the **Outline Environmental Management Plan** (EMP)) has been submitted with this Application (**Volume 4** of the **EIA Report**). This Outline MPCP outlines details of procedures to protect personnel working and to safeguard the marine environment and mitigation measures in the event of an accidental pollution event arising from offshore operations relating to the Project. The Final MPCP will be completed prior to construction commencing and submitted to Marine Directorate - Licensing Operations Team (MD-LOT) for approval and will include relevant key emergency contact details.	Scoping Amended at EIA Report.	s.36 conditions and marine licences conditions.	Marine mammals
M-038	An **Outline Lighting and Marking Plan** (LMP) has been submitted with this Application (**Volume 4** of the **EIA Report**). The Final LMP will be completed prior to construction commencing and submitted to MD-LOT for approval. The LMP will confirm compliance with Northern Lighthouse Board requirements and in Line with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Recommendation G1162 (IALA, 2021) with regards to shipping, navigation and aviation marking and lighting during construction and operational and maintenance phase of the works.	Scoping Amended at EIA Report.	s.36 conditions and marine licences conditions.	Marine mammals Offshore and intertidal ornithology
M-039	An **Outline Vessel Management and Navigational Safety Plan** has been submitted with this Application (**Volume 4** of the **EIA Report**). The Final Vessel Management and Navigation Safety Plan will be completed prior to construction commencing and submitted to MD-LOT for approval. The Final Plan will: a) confirm the types and numbers of vessels that will be engaged on the Project;	Scoping Amended at EIA Report.	s.36 conditions and marine licences conditions.	Marine mammals

ID	Environmental measure proposed	Project stage measure introduced	How the environmental measures will be secured	Relevant technical aspect
	b) consider vessel coordination including indicative transit route planning; d) describe measures put in place by the Project related to navigational safety, including information on Safety Zones, charting construction buoyage, temporary lighting and marking; and e) provide a means of notification of Project activity to other sea users (e.g. via Notice to Mariners).			
M-043	Development of and adherence to a Development Specification and Layout Plan, which will confirm the Project's layout and design parameters. This will be submitted to MD-LOT for approval post-consent.	Scoping Amended at EIA Report.	Company Marine Operations Manual and Aids to Navigation Plan, s.36 conditions and marine licences conditions.	Offshore and intertidal ornithology
M-049	An **Outline Project Environmental Monitoring Programme** (PEMP) has been submitted with this Application (**Volume 4** of the **EIA Report**). The Final PEMP will be completed prior to construction commencing and submitted to MD-LOT for approval. The Final PEMP will set out commitments to environmental monitoring in pre-, during and post-construction stages of the Project.	Scoping Amended at EIA Report.	s.36 conditions and marine licences conditions.	Marine mammals Offshore and intertidal ornithology
M-054	A detailed Cable Burial Risk Assessment (CBRA) will be undertaken to enable informed judgements about burial depth. This should reduce the risk of buried cables reemerging whilst also limiting the amount of sediment disturbance to that which is necessary. The array and export cables will typically be buried at a target burial depth between 1 to 2m below the seabed surface. The final depth of the cable will be dependent on the seabed mobility and CBRA. The CBRA will manage and mitigate risks from loading and sediment transport across the seabed. The CBRA will be included within the Final Cable Plan.	Scoping Amended at EIA Report.	s.36 conditions and marine licences conditions.	Marine mammals

ID	Environmental measure proposed	Project stage measure introduced	How the environmental measures will be secured	Relevant technical aspect
M-056	To reduce environmental impact of the landfall, a trenchless solution (e.g. HDD) is to be implemented to install ducts at landfall. Determination of the most suitable trenchless landfall crossing method will be undertaken during the detailed design stage of the Project, following geotechnical investigations of the onshore and nearshore areas.	Scoping Amended at EIA Report.	Project design, s.36 conditions and marine licences conditions.	Offshore and intertidal ornithology
M-057	Burial of the cables where possible and / or use of external cable protection such as rock placement and / or concrete mattressing. Concrete mattresses only used in isolation in non-fished areas to ensure no snagging issues for fisheries industry. Where appropriate, nature-inclusive design options will be considered in the selection and placement of cable protection measures.	Scoping Amended at EIA Report.	Project description.	Marine mammals
M-063	A CEMP will be implemented by the contractor in accordance with **Volume 4: Outline Construction Environmental Management Plan**. The contractor will ensure that the relevant environmental measures within the CEMP and health and safety procedures are implemented. The CEMP identifies the project management structure roles and responsibilities with regard to managing and reporting on the environmental impact of the construction stage.	Scoping Amended at EIA Report.	**Volume 4, Outline Construction Environmental Management Plan** and planning conditions.	Terrestrial ecology and ornithology
M-066	The permanent rights of servitude for the onshore export cable corridor will be kept to the minimum width needed for safe access for cable maintenance or replacement purposes during operation of the Project.	Scoping Amended at EIA Report.	Planning conditions.	Terrestrial ecology and ornithology
M-085	The Project will avoid causing fragmentation of woodland, semi-natural land or sensitive habitats where possible, through the use of existing breaks in land use or use of HDD (or similar trenchless technique) to avoid disturbance of / change to land cover.	Scoping Amended at EIA Report.	**Volume 4, Outline Construction Environmental Management Plan**,	Terrestrial ecology and ornithology

ID	Environmental measure proposed	Project stage measure introduced	How the environmental measures will be secured	Relevant technical aspect
			description of project and planning conditions.	
M-105	An **Outline Piling Strategy** has been submitted with this Application (**Volume 4** of the **EIA Report**). The Final Piling Plan will be completed prior to construction commencing and submitted to MD-LOT for approval. It will detail the method of pile installation and associated underwater noise levels. It will describe any mitigation measures to be implemented (e.g. soft start and ramp up measures, or the use of acoustic deterrent devices) prior to and during pile installation to manage the effects of underwater noise.	Scoping Amended at EIA Report.	s.36 conditions and marine licences conditions.	Marine mammals
M-106	The development of and adherence to a Decommissioning Programme. The Decommissioning Programme will outline measures for the decommissioning of the Project. The Decommissioning Programme would be submitted prior to construction commencing to MD-LOT and approved by Scottish Ministers prior to construction.	Scoping Amended at EIA Report.	Required under Section 105 (Energy Act 2004) and marine licences consent conditions.	Marine mammals
M-114	The Project will use 'low order' techniques such as deflagration for UXO disposal, where possible and required.	Scoping	Required under the Habitats Regulations and marine licences consent conditions.	Marine mammals
M-115	The UXO Management Plan will mitigate any potential for UXO within the offshore construction area and also disposal once encountered.	Scoping	s.36 conditions and marine licences conditions.	Marine mammals
M-120	An **Outline Construction Method Statement** (CMS) has been submitted with this Application (**Volume 4** of the **EIA Report**). The Final CMS will be completed prior to construction commencing and submitted to MD-LOT for approval. The Final CMS will include: a) details of the commence dates, duration and phasing of key elements of construction, working areas, the construction procedures and good working practices;	EIA Report.	s.36 conditions and marine licences conditions.	Offshore and intertidal ornithology

ID	Environmental measure proposed	Project stage measure introduced	How the environmental measures will be secured	Relevant technical aspect
	b) details of the roles and responsibilities; and c) details of how the construction related mitigation step proposed are to be delivered.			
M-121	An **Outline Environmental Management Plan** (EMP) has been submitted with this Application (**Volume 4** of the **EIA Report**) and includes the following Appendix: - **Outline Marine Pollution Contingency Plan**. The Final EMP will be completed prior to construction commencing and submitted to MD-LOT for approval. The Final EMP will be implemented by the contractor(s). The contractor(s) will ensure that the relevant environmental measures within the EMP and health and safety procedures are implemented. The Final EMP will identify the project management structure roles and responsibilities with regard to managing and reporting on the environmental impact of the construction and O&M stages. Other measures that feed into the EMP include: - A Waste Management Plan (WMP) will be developed as an Appendix of the EMP post-submission to manage all waste generated during the construction and operation stages of the Project. The WMP will be appended to the Environmental Management Plan. The WMP will follow the principles of the waste hierarchy (Department for Environment, Food & Rural Affairs, 2001) which consists of: prevention, re-use, recycle, other recovery and disposal. - The Final EMP will include a Chemical Risk Assessment to identify, evaluate and mitigate potential environmental and health risks associated with the use, storage and disposal of hazardous substances during O&M and decommissioning stages of the Project. The EMP will be the securing mechanism for many measures.	EIA Report.	s.36 conditions and marine licences conditions.	Marine mammals Offshore and intertidal ornithology

ID	Environmental measure proposed	Project stage measure introduced	How the environmental measures will be secured	Relevant technical aspect
M-122	Development of and adherence to an Offshore Operations and Maintenance Plan, which will confirm the Project's operations and maintenance activities. This will be submitted to MD-LOT for approval post-consent.	EIA Report.	s.36 conditions and marine licences conditions.	Marine mammals
M-133	An ECoW will oversee the construction stage works ensuring that works areas can be appropriately micro-sited where appropriate to avoid or minimise habitat loss, in accordance with the Outline CEMP and latest available species specific guidance.	EIA Report.	**Volume 4: Outline Construction Environmental Management Plan** and planning conditions.	Terrestrial ecology and ornithology
M-134	Pre-construction ecology surveys will be undertaken to inform the specification of relevant impact avoidance and mitigation measures, such as relevant stand-off distances etc, in accordance with the Outline CEMP and latest available species specific guidance.	EIA Report.	**Volume 4: Outline Construction Environmental Management Plan**, description of Project and planning conditions.	Terrestrial ecology and ornithology
M-135	An onshore SPP outlining how the Project will address potential impacts on protected species, in accordance with the **Volume 4: Outline Construction Environmental Management Plan** and latest available species-specific guidance. This will include a Bird Protection Plan (BPP) to safeguard breeding and wintering bird species. Adherence to the BPP will be employed to ensure careful timing of construction activities within or near to sensitive locations will avoid or minimise effects on all breeding birds as well as foraging winter wildfowl (including geese and swans), including noise reduction measures, including the employment of 'soft-start' measures to all noisy activities to avoid sudden disturbance, minimising the working footprint avoidance or reduction of any working during hours of darkness. The SPP and BPP will be updated with data from the pre-construction surveys. Implementation of the BPP would be overseen	EIA Report.	**Volume 4: Outline Construction Environmental Management Plan**, description of Project and planning conditions.	Terrestrial ecology and ornithology

ID	Environmental measure proposed	Project stage measure introduced	How the environmental measures will be secured	Relevant technical aspect
	by a suitably experienced ECoW or Project Ecologist in order to inform the construction stage process.			
M-213	Good practice measures to prevent harm to fauna will include the careful storage of potentially dangerous substances or materials within construction compounds. All excavations greater than 1m depth would either be temporarily covered at night or designed to include a ramp to allow fauna (such as protected mammals) a means of escape should they fall in.	EIA Report.	**Volume 4: Outline Construction Environmental Management Plan**, description of Project and planning conditions.	Terrestrial ecology and ornithology
M-214	Working during the hours of darkness will be avoided as far as practicable to reduce disturbance to protected species. Working during the hours of darkness will likely be unavoidable during winter, therefore lighting will avoid illuminating sensitive habitats including rivers, wetlands and sites where there is known activity of protected or notable species.	EIA Report.	**Volume 4: Outline Construction Environmental Management Plan**, description of Project and planning conditions.	Terrestrial ecology and ornithology

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