MacArthur Green

West of Orkney Windfarm

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West of Orkney Windfarm

Offshore Ornithology Additional Information

Addendum to the Report to Inform Appropriate Assessment: HRA Stage 2 - SPA Appropriate Assessment

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1 INTRODUCTION

1.1 Project Summary

1. Offshore Wind Power Limited (OWPL) ('the Applicant') is proposing the development of the West of Orkney Windfarm ('the Project'), an Offshore Wind Farm (OWF), located at least 23 kilometres (km) from the north coast of Scotland and 28 km from the west coast of Hoy, Orkney (**Figure 1-1**).

2. The offshore Project (hereafter defined as 'the Project') will comprise up to 125 wind turbine generators (WTGs) with fixed-bottom foundations and up to five Offshore Substation Platforms (OSPs). The area within which the WTGs, OSPs and associated infrastructure will be located is the Option Agreement Area (OAA). The OAA covers an area of 657 km^2. The export cables will be located within the Export Cable Corridor (ECC), with landfall options at Greeny Geo and/or Crosskirk at Caithness (**Figure 1-1**). The OAA and ECC together comprise the offshore Project area[1].

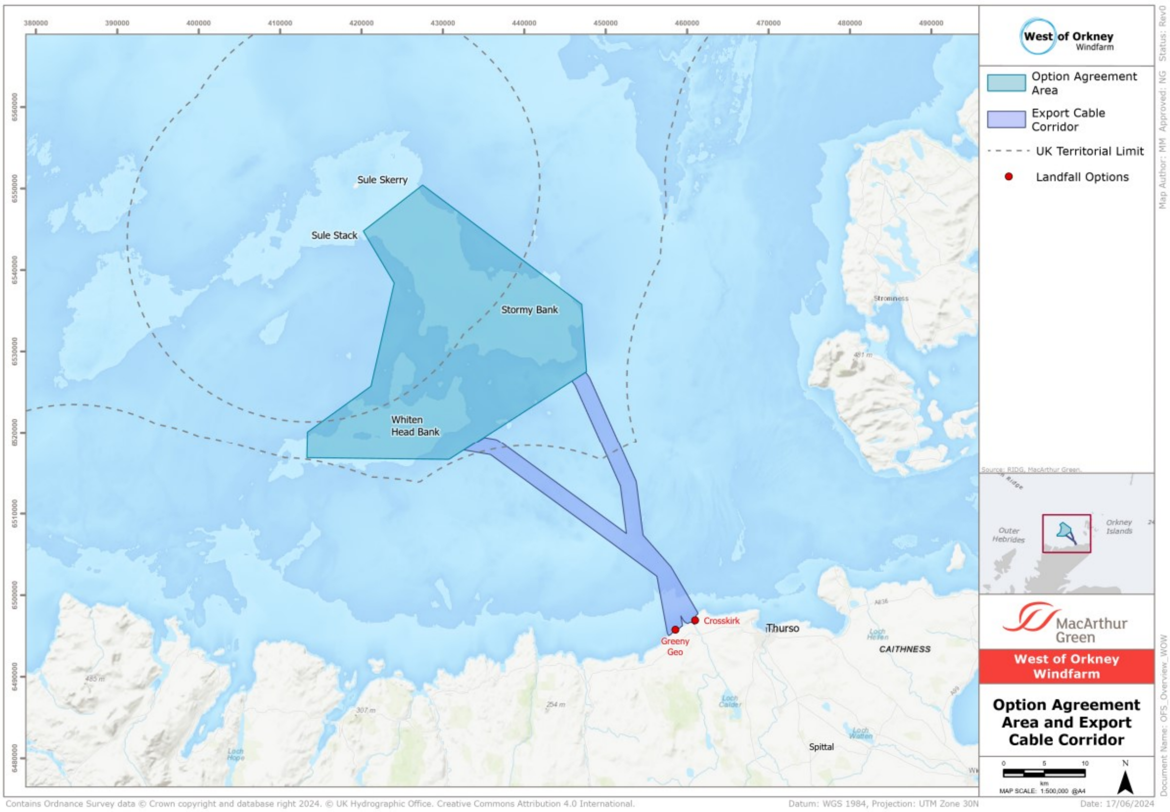

Figure 1-1. Map showing location of the West of Orkney Windfarm Option Agreement Area (OAA) and Export Cable Corridor (ECC) which together, comprise the offshore Project area.

[1] *More details about the Project, including details of the Project boundary and offshore infrastructure can be found in the original Report to Inform Appropriate Assessment (the 'original RIAA', West of Orkney Windfarm - Offshore HRA Screening Report (marine.gov.scot) <https://marine.gov.scot/sites/default/files/west_of_orkney_windfarm_-_report_to_inform_appropriate_assessment_riaa_riaa_supporting_studi.pdf>), Section 2. Note, all Project specifications relevant to this assessment remain unchanged from the original RIAA.*

3. The Applicant submitted an application for consent under Section 36 of the Electricity Act 1989 and Marine Licences under Part 4 of the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 to Scottish Ministers in September 2023 (the 'Offshore Application') for the offshore components of the Project seaward of Mean High Water Springs (MHWS) ('the offshore Project').

4. In accordance with relevant EIA and HRA regulations, an Offshore Environmental Impact Assessment (EIA) Report was submitted to Marine Directorate – Licensing Operations Team (MD-LOT) as part of the Applicant's consent application. A Report to Information Appropriate Assessment (RIAA) was submitted as part of the Offshore Application to provide the Competent Authority (MD-LOT) with the information required to assist them in undertaking an Appropriate Assessment (AA) for the offshore Project as required under the Conservation (Natural Habitats & c.) Regulations 1994 (as amended), the Conservation of Marine Habitats and Species Regulations 2017 and The Conservation of Habitats and Species Regulations 2017 (as amended) (hereafter referred to as the 'Habitats Regulations').

5. The original **Chapter 13: Offshore and Intertidal Ornithology of the Offshore EIA Report** and the original **Report to Inform Appropriate Assessment (RIAA)** provided the assessment of potential effects from the offshore Project on ornithological features, both from the offshore Project alone and also cumulatively/in-combination with other projects, plans and activities, and whole Project perspective.

6. Following the review of the application, and upon receipt of representations from consultees, MD-LOT issued a request for additional information on offshore ornithology. This report is part of the Ornithology Additional Information (see **Introduction to the Additional Ornithology EIA Information and HRA Addendum** for details of the structure and content of the Ornithology Additional Information).

1.2 Relationship between the original application and the OAI

7. The Ornithology Additional Information (OAI) (see **Introduction to the Additional Ornithology Information** for structure of OAI and list of all reports) includes:

- An **Addendum to the Offshore EIA Report** in the form of a revised EIA chapter for Offshore and Intertidal Ornithology. All ornithology information in this report should be read in place of information in the original EIA chapter;
- This report, which is an **Addendum to the RIAA**. All ornithology information in this report should be read in place of information in the original RIAA (with the exception of information on pre-application consultation);
- A set of nine technical appendices. These reports entirely replace the original Supporting Study 12: Offshore Ornithology Technical Supporting Study.

8. NatureScot's pre- and post-application Project-specific advice and online guidance notes[2] were followed throughout the OAI. To demonstrate this, reference to NatureScot's guidance and advice is made throughout the OAI, either in the text or in separate text boxes.

[2] *Guidance Note 1: Guidance to support Offshore Wind Applications: Marine Ornithology - Overview | NatureScot*

1.3 Purpose of this Report

9. This report is an Addendum to the original RIAA. The original RIAA considered all features of European sites, including ornithology. This Addendum to the RIAA updates only ornithological information in the original RIAA[3]. This Addendum supersedes the original RIAA and should be used when considering effects on ornithological interests with respect to the Offshore Application, rather than the original RIAA.

10. The Habitats Regulations Appraisal (HRA) process requires an initial screening stage, during which any Special Protection Area (SPA) for which there is no Likely Significant Effect (LSE) from the offshore Project on the conservation objectives of that SPA, is screened out. The original RIAA included an HRA screening section. This has been fully reviewed and updated. A summary of the revised HRA screening is presented in this Addendum to the RIAA, with the full screening presented in **Appendix 2 - HRA: HRA Screening Technical Report**.

11. While Ramsar Sites are not assessed under the HRA regulations, where a Ramsar Site is also an SPA, the assessment and conclusions of the HRA also apply to the Ramsar site.

12. This Addendum then summarises the methods used to undertake the assessment of effects on SPAs and Ramsar sites, including calculation of collision and displacement mortalities, apportioning of mortalities to SPAs and Ramsar sites, collation of in-combination mortalities from other OWFs and, where required, an assessment of the population response to those mortalities (i.e. running a Population Viability Analysis (PVA) model).

13. The Addendum then considers each SPA and Ramsar site which has been screened into the RIAA, i.e. each SPA requiring an Appropriate Assessment. Information on each SPA and Ramsar site is presented (e.g. conservation objectives, qualifying features, etc.) and details of the qualitative and/or quantitative assessments undertaken are provided. Finally, a conclusion of whether the Project alone, and/or in-combination with other OWFs, will have an adverse effect on site integrity is provided.

1.4 Terminology

14. This Addendum and documentation supporting the Ornithology Additional Information uses the following terminology for the offshore Project:

- AEoSI: Adverse Effect on Site Integrity. Consideration of whether the Project's predicted ornithological effects, alone and/or in-combination with other OWFs, are sufficiently large to affect the conservation objectives of a site (in this case, an SPA or Ramsar site);
- ECC: Export Cable Corridor. The area along which the export cable will be installed;
- OAA: Option Agreement Area. The development area in which the WTGs and associated infrastructure will be installed. This was the area over which density of birds was estimated to inform collision risk modelling;

[3] *A separate RIAA Addendum – All other topics (excluding ornithology) has been provided as part of the Additional Information.*

- OAA plus 2 km buffer: the OAA plus an area extending to a further 2 km beyond the OAA boundary. This was the area over which abundance was estimated to inform displacement mortality estimation;
- OAA plus 4km buffer: the OAA plus an area extending to a further 4 km beyond the OAA boundary. This was the area over which baseline site characterisation was ascertained;
- Offshore Project area: the extent of the offshore components of the West of Orkney Windfarm, i.e. the OAA and the ECC;
- OSP: Offshore Substation Platform;
- PVA: Population Viability Analysis. A population model which assesses how future population size and growth rate would be expected to change in the presence of additional mortality from the Project alone and in-combination with other OWF.

2 HRA CONSULTATION

15. Details of consultation that was undertaken prior to submitting the Offshore Application can be found in **Section 5** of the original **RIAA**. Substantial post-application consultation has been undertaken with NatureScot to ensure that the Additional Information fully addresses all the issues that NatureScot raised in their advice of 13 December 2023. **Table 2-1** summarises the post-application submission consultation that has been undertaken.

Table 2-1. Summary of post-application consultation on offshore ornithology.

Date	Consultation	Consultee
13 December 2023	NatureScot Interim Advice. Letter from NatureScot to MD-LOT (CNS REN OSWF ScotWind - N1 - Offshore Wind Power Limited - West of Orkney)	NatureScot
13 December 2023	RSPB Scotland representation. Letter from RSPB to MD-LOT	RSPB Scotland
26 February 2024	Offshore ornithology workshop (online)	MD-LOT, NatureScot
11 March 2024	Letter from the Project to NatureScot (WO1-WOW-CON-EV-LT-0005 Offshore Ornithology Questions for NatureScot)	NatureScot
27 March 2024	Letter from NatureScot to West of Orkney Windfarm (CNS REN OSWF-ScotWind - N1 - West of Orkney - Application)	NatureScot
12 April 2024	Letter from MacArthur Green to NatureScot (WO1-WOW-CON-EV-LT-0013)	NatureScot
30 April 2024	Consultation meeting	NatureScot and MD-LOT
7 May 2024	Consultation meeting	NatureScot
13 May 2024	Letter from West of Orkney Windfarm to RSPB (WO1-WOW-CON-EV-LT-0014)	RSPB
14 May 2024	Consultation meeting	NatureScot
21 May 2024	Consultation meeting	NatureScot
28 May 2024	Email from MacArthur Green to MD-LOT	MD-LOT
28 May 2024	Consultation meeting	NatureScot
3 June 2024	Letter from NatureScot to MacArthur Green (CNS REN OSWF-ScotWind-N1 OWPL West of Orkney A)	NatureScot
4 June 2024	Consultation meeting	NatureScot
10 June 2024	Email from MD-LOT to MacArthur Green	MD-LOT
11 June 2024	Consultation meeting	NatureScot
18 June 2024	Consultation meeting	NatureScot
25 June 2024	Consultation meeting	NatureScot
2 July 2024	Consultation meeting	NatureScot
9 July 2024	Email from NatureScot to the Project	NatureScot

3 INFORMATION TO INFORM ASSESSMENT

3.1 Design envelope parameters relevant to ornithological features

16. The Worst-Case Scenario (WCS) for the assessment of adverse effect on site integrity is based on the design option (or combination of options) that represents the highest predicted impact on populations of qualifying features of SPAs and Ramsar sites. Using a WCS gives confidence that any subsequent changes to the design parameters would result in impacts that are the same or lower than those assessed here.

17. The final offshore Project design is dependent upon site constraints, and therefore can only be determined post-consent, once all relevant information from the offshore Project area has been gathered, e.g. seabed survey data, identification of Unexploded Ordnance (UXO) and boulder presence. The final design of the offshore Project will be confirmed through detailed ongoing engineering design studies, including the development of the ground model. The final design, including array area and number of WTGs, will be captured in the Development Specification and Layout Plan (DSLP) which will be informed by the ongoing engineering work and in consultation with interested stakeholders. The number of WTGs and array area will be less than those values that have been used to inform the predicted collision risk and displacement impacts presented in the assessment. As a result, the assessment of predicted impacts on birds is a WCS.

18. **Table 3-1** presents the worst-case design parameters for potential impacts on ornithological features during construction, operation and maintenance, and decommissioning stages of the offshore Project.

Table 3-1. Design parameters specific to the ornithological assessment.

Potential impact	Design envelope scenario assessed
Construction (including pre-construction) and decommissioning*	
1. Disturbance and/or displacement	Up to a maximum of 30 construction vessels within the offshore Project simultaneously and 1,722 return vessel transits annually; Maximum piling duration of 290 days; Maximum construction schedule of 24 hours a day, 7 days a week; A total of up to 4 years of construction period (with an additional year of pre-construction activities).
2. Direct and indirect impacts on prey or supporting habitat	Maximum spatial disturbance to fish and shellfish during construction of due to underwater noise from piling of up to 125 WTGs with monopile foundations and a maximum hammer energy of 5,000 kJ with maximum of 1 pile per day (over 125 days) and up to 16 hours piling per day; Maximum temporal disturbance to fish and shellfish during construction piling of up to 125 jacket foundations (500 piles) using maximum hammer energy of 3,000 kJ with maximum of 2 piles per day and up to 8 hours piling per day (over 250 days); Additionally piling of up to five OSP pin-pile jacket foundations, each with 16 piles required (total of 80 piles) with a maximum of two piles per day and up to eight hours of piling per day (40 piling days), at 3,000 kJ hammer energy (in hard or soft sediment);

Potential impact	Design envelope scenario assessed
	Maximum area of temporary habitat disturbance or loss to benthic habitats during construction would be approximately 69.12 km^2 across the offshore Project; and Disturbance/displacement from increased suspended sediment concentration.
3. Lighting impacts from construction vessels	Up to a maximum of 30 construction vessels within the offshore Project simultaneously and 1,722 return vessel transits annually; Maximum construction schedule of 24 hours a day, 7 days a week; A total of up to 4 years of construction period (with an additional year of pre-construction activities).
Operation and maintenance	
4. Collision risk	Maximum of 125 turbines x 330 m rotor diameter; WTGs and OSPs across the full OAA; and Operational life up to 30 years[4].
5. Disturbance and/or displacement (including barrier effects)	WTGs and OSPs across the full OAA; Maximum of 125 turbines with minimum spacing of 944 m between turbines; Maximum of five high voltage alternating current (HVAC) offshore substation platforms (OSPs); Up to 12,695 return transits from operation and maintenance vessels estimated throughout the operational life of the offshore Project; and Maximum of 19 vessels at the site simultaneously.
6. Direct and indirect impacts on prey or supporting habitat	Maximum area of seabed footprint occupied by the offshore Project resulting in permanent habitat loss is up to 7.34 km^2[5].
7. Lighting impacts from turbines and vessels	Artificial lighting on WTGs and OSPs will be installed in line with aviation and maritime lighting requirements. WTGs will be marked by lights that are visible from two nautical miles from all angles.

*In the absence of detailed information regarding decommissioning works, the implications for SPAs and Ramsar sites designated for ornithological features are considered analogous to or likely less than those of the construction stage. Therefore, the worst-case parameters defined for the construction stage also apply to decommissioning.

3.2 Embedded mitigation and management plans relevant to ornithological features

19. Certain measures have been adopted as part of the Project development process in order to reduce the potential for impacts to the environment, as presented in **Table 3-2**. These have been accounted for in the assessment presented below. General mitigation measures, which would apply to all parts of the Project, are set out first. Thereafter mitigation measures that

[4] An operational period of 35 years has been assumed for CRM as WTGs will be present in the OAA and potentially turning ahead of first power.

[5] Benthic Subtidal and Intertidal Ecology Additional Information document provides further consideration of long-term impacts from the Project, particularly on boulder clearance in areas of Annex I stony reef. Due to the nature of the activity and the characteristics of the habitat this may result in a long-term habitat change across an area of up to 30.4 km2. Although this area would not be permanently lost the habitat type may change, with boulders being relocated (largely nearby) and resulting in a sediment dominated substrate being present in the cleared area, albeit one that is already widely present across the offshore Project area

would apply specifically to offshore ornithology issues associated with the OAA and offshore ECC are described separately.

Table 3-2. Embedded mitigation measures relevant to offshore ornithology.

Mitigation measure	Description	How mitigation will be secured
Site selection	The offshore Project including the OAA and the offshore ECC avoids any overlap with designated sites (i.e. SPAs) for birds. The OAA's 2 km buffer overlaps with the Sule Skerry & Sule Stack SPA, however due to the Restricted Build Areas, no WTGs would be located within 3.7 km of the SPA (including marine extension) – see Introduction to the Additional Ornithology EIA Information and HRA Addendum. This would reduce displacement impacts by reducing the Project footprint and reduce collision risks for some species by maintaining a 2 km separation distance from the SPA.	Already secured through the OAA location.
Landfall installation	Landfall installation methodology (HDD) will avoid direct impacts to the intertidal area.	Secured through the description of the development within the Section 36 Consent and/or Marine Licence.
Minimum WTG blade clearance	Blade clearance of 27.05 m above MSL (29.52 m above LAT), which is in excess of the minimum requirement of 22 m above MHWS. A higher blade clearance reduces the number of birds likely to be flying at rotor swept height and so decreases potential collision mortality.	Secured through the description of the development within the Section 36 Consent and/or Marine Licence.
Navigational Safety and Vessel Management Plan (NVSMP)	Describes proposed navigational safety measures and vessel management measures including restrictions on vessels' speed and routes to be used by vessels to ensure navigational safety. Details to be confirmed post-consent.	Secured through all vessels being required to adhere to the NSVMP. An outline NSVMP was provided as part of the offshore application in OP4: Outline Navigational Safety and Vessel Management Plan.
Lighting	Excess lighting, above levels set by regulatory requirements for navigation, aviation, escape/emergency procedures and general activity, will be avoided wherever possible. External general lighting will use timers and/or passive infrared sensor devices to reduce excessive lighting of the WTGs and Offshore Substation Platforms (OSPs).	Requirements will be detailed in the LMP. An outline LMP was provided as part of the offshore application in OP6: Outline Lighting and Marking Plan. The outline LMP contains details on the proposed lighting requirements for the construction and operation and maintenance stage.
Decommissioning Programme	The development of, and adherence to, a Decommissioning Programme approved by Scottish Ministers prior to construction and updated throughout the Project lifespan.	The production and approval of a Decommissioning Programme will be required under Section 105 of the Energy Act 2004 (as amended).

4 SUMMARY OF HRA SCREENING

20. The HRA screening process, used to inform the scope of this RIAA, is presented in **Appendix 2 - HRA: HRA Screening Technical Report**. The screening process followed the guidance presented by NatureScot in their suite of Guidance to support Offshore Wind Applications[6], particularly Guidance Note 3: *Marine Ornithology - Identifying theoretical connectivity with Special Protection Areas using breeding season foraging ranges*[7]; Guidance Note 4: *Marine Ornithology - Determining Connectivity of Marine Birds with Marine Special Protection Areas and Breeding Seabirds from Colony SPAs in the Non-Breeding Season*[8] and Guidance Note 6: *Guidance to support Offshore Wind Applications - Marine Ornithology Impact Pathways for Offshore Wind Developments*[9].

21. The process also took into account comments provided by NatureScot on the original **RIAA** and post-submission consultation, as presented in **Introduction to the Additional Ornithology EIA Information and HRA Addendum** and summarised in **Table 4-1** of that report.

22. The following sections summarise the two main steps of the HRA screening process that were undertaken, namely (i) establishing theoretical connectivity between SPAs (and Ramsar sites) and the offshore Project area, and (ii) identifying impact pathways for LSE, where connectivity occurs. Included in these sections are summaries of key advice received from NatureScot on the matters.

4.1 Establishing theoretical connectivity

NatureScot advice (letter dated 26 March 2024):

We advise that at present it is difficult to follow the sites and qualifying features through the various steps of the assessment within the RIAA as there are a number of inconsistencies and at times a lack of information as to why sites (and qualifying features) have been screened out from further assessment. Therefore, for each step of the assessment the sites and qualifying features, including assemblage species, should be provided in tabulated format, with justification provided as to why each site (and qualifying feature) are being screened out from further assessment.

23. **Appendix 2 - HRA: HRA Screening Technical Report** lays out the steps by which UK SPAs and Ramsar sites were screened out due to the absence of theoretical connectivity between an SPA and the offshore Project. The steps follow NatureScot's Guidance Note 3 and Guidance Note 4.

[66] https://www.nature.scot/doc/guidance-note-1-guidance-support-offshore-wind-applications-marine-ornithology-overview

[7] Guidance Note 3: Guidance to support Offshore Wind applications: Marine Birds - Identifying theoretical connectivity with breeding site Special Protection Areas using breeding season foraging ranges | NatureScot

[8] Guidance Note 4: Guidance to Support Offshore Wind Applications: Ornithology - Determining Connectivity of Marine Birds with Marine Special Protection Areas and Breeding Seabirds from Colony SPAs in the Non-Breeding Season | NatureScot

[9] Guidance Note 6: Guidance to support Offshore Wind Applications - Marine Ornithology Impact Pathways for Offshore Wind Developments | NatureScot

24. Theoretical connectivity between the offshore Project area and SPAs and Ramsar sites was established under the following criteria, which are listed in NatureScot's guidance notes 3 and 4:

   a. For the breeding season, SPAs with breeding seabird qualifying features within foraging range of the offshore Project area plus 2 km buffer (distances in **Table 4-1**, as advised by NatureScot's Guidance Note 3). Seabird qualifying features were restricted to the 12 species recorded in the OAA plus 4 km buffer in non-trivial numbers in the breeding season. These were Arctic tern, European storm petrel, fulmar, gannet, great black-backed gull, great skua, guillemot, herring gull, kittiwake, Manx shearwater, puffin and razorbill. However, herring gull were present in very low densities (a total of 14 individuals recorded across all 27 digital aerial surveys of the OAA plus 4 km buffer) and a decision was made to not screen in herring gull features of SPAs as predicted collision impacts would be very small.

   b. For the non-breeding season, SPAs with breeding seabird qualifying features within the UK North Sea Biologically Defined Minimum Population Scale (BDMPS) region (Furness, 2015). Seabird qualifying features were restricted to the nine species recorded in the Project Survey Area in non-trivial numbers in the non-breeding season, with the exception of guillemot (see below).

   c. For the non-breeding season, SPAs with breeding guillemot qualifying features were screened in on the same basis as was used for establishing breeding season connectivity (as advised in NatureScot Guidance Note 4). This was due to guillemots remaining close to their breeding colonies year-round, unlike other seabird species;

   d. Whilst red-throated divers were recorded in the OAA plus 4 km buffer in only trivial numbers by digital aerial surveys, theoretical connectivity with terrestrial SPAs with breeding red-throated diver SPAs was established for cable laying activities in the offshore ECC and for construction vessels on transit to/from the offshore Project area and the construction port (which has yet to be determined);

   e. For marine SPAs, theoretical connectivity was established if:

      i. A marine SPA with wintering waterfowl qualifying features and, in some cases, a breeding red-throated diver qualifying feature, was within 15 km of either the offshore Project area or vessel transit routes used during construction and operation of the Project;

      ii. A marine SPA had functional connectivity with a terrestrial SPA with breeding red-throated diver features, whereby the divers forage within the marine SPA in the breeding season. Theoretical connectivity with the marine SPA was established if the offshore. Where connectivity was established for the marine SPA, connectivity was also assumed for the functionally-linked terrestrial SPA;

      iii. A marine SPA had functional connectivity with a colony SPA with breeding seabird features, whereby the seabirds forage within the marine SPA in the breeding season. Theoretical connectivity with the marine SPA was established if either the boundary of the marine SPA or the colony SPA was within the foraging range of the qualifying species of that SPA;

iv. Marine extensions of terrestrial colony SPAs either overlapped with the OAA and/or ECC plus 2 km buffer and/or vessels were transiting through a marine extension during construction or operation of the Project.

v. For SPAs that contain non-seabird migratory qualifying features, theoretical connectivity was established if the Project had the potential to impact migrating birds due to collisions. UK SPAs were screened in if they contained a migratory pathway that overlapped with the offshore Project area, based on a review by Woodward *et al.* (2023).

25. **Table 4-4** lists all SPA and Ramsar sites with breeding seabird features, breeding red-throated diver features and wintering waterfowl features for which theoretical connectivity was established. The table also indicates whether an SPA with breeding seabird features had theoretical connectivity with the OAA in the breeding season (i.e. the SPA was within foraging of the OAA plus 2 km buffer) and/or the non-breeding season (i.e. the SPA was in the UK North Sea BDMPS region, with the exception of guillemot).

Table 4-1. Breeding season foraging range metrics used to determine theoretical connectivity for screening SPA qualifying features in/out of the HRA.

Species	NatureScot recommended Foraging Range (km)	Metric
European storm-petrel	336.0	Max/MM
Northern fulmar	1,200.2	MM+SD
Manx shearwater	2,365.5	MM+SD
Northern gannet	509.4	MM+SD
Northern gannet (Forth Islands SPA)	590.0	Max
Northern gannet (Grassholm SPA)	516.7	Max
Northern gannet (St Kilda SPA)	709.0	Max
Black-legged kittiwake	300.6	MM+SD
Great black-backed gull	73.0	Max/MM
Herring gull	85.6	MM+SD
Arctic tern	40.5	MM+SD
Great skua	931.2	MM+SD
Common guillemot (all SPAs except for Northern Isles SPAs)	95.2	MM+SD
Common guillemot (all Northern Isles SPAs)	153.7	MM+SD
Razorbill	122.2	MM+SD
Razorbill (all Northern Isles SPAs)	164.6	MM+SD
Atlantic Puffin	265.4	MM+SD

MM = mean of the maximum foraging range. Max = maximum foraging range. SD = standard deviation.

4.2 Impact pathways for LSE

26. For all SPA and Ramsar sites identified as having theoretical connectivity with the offshore Project, the second step of the HRA screening exercise in **Appendix 2 - HRA: HRA Screening Technical Report** was to determine whether there may be a potential impact pathway for a LSE, and hence a requirement for Appropriate Assessment. The exercise followed the principles outlined in NatureScot Guidance Note 6: *Guidance to support Offshore Wind Applications: Marine Ornithology Impact Pathways for Offshore Wind Developments*[10].

27. NatureScot Guidance Note 3 advises that "Once the initial list of SPA qualifying features with theoretical connectivity is produced, it can be refined further… Species impact pathways, and sensitivity to an impact will also inform decisions on LSE." Determining LSE is therefore informed by species' impact pathways, results of site characterisation surveys and species sensitivity to impacts.

28. The assessment of LSE combined information on impact pathways and characteristics of qualifying interests as part of a high-level appraisal to determine whether or not there is potential for any of the conservation objectives relating to the qualifying interests of a European site to be undermined on the basis of the potential effects. Where there was no potential for the conservation objective to be undermined, it was concluded that there was "no LSE" and that site was screened out from a more detailed assessment.

29. A full justification for ruling out for LSE of certain construction, operation & maintenance and decommissioning phase impact pathways is provided in **Appendix 2 - HRA: HRA Screening Technical Report.** Briefly, the following impact pathways were screened out for the following SPA qualifying features.

4.2.1 Impact pathways which were screened out

4.2.1.1 Disturbance, displacement and barrier impact pathways during construction

30. Impact pathways of disturbance and/or displacement, and direct/indirect impacts on prey or supporting habitat, during construction, operation and decommissioning were screened out for SPAs and Ramsar sites with migratory species qualifying features (excluding seabirds). Migratory species (excluding seabirds) are assumed to not be affected by disturbance and displacement while flying near or through the Project on migration (as per NatureScot Guidance Note 7: *Guidance to support Offshore Wind Applications: Marine Ornithology - Advice for assessing collision risk of marine birds*[11]). As birds are migrating through the offshore Project area, rather than stopping to use the marine area, it is assumed there will be no displacement impacts in terms of loss of foraging habitat or disruption of other key behaviours. This is because these species are briefly passing through the offshore Project area whilst migrating to/from their breeding and wintering grounds. Most of these migratory species are not capable of foraging in the offshore marine environment (e.g. raptors, waders, geese, ducks) and so would not be stopping to use the offshore Project area.

31. Migratory birds may undertake a small deviation from their intended migration route to avoid the offshore Project area during construction (i.e. barrier effects) but this deviation would

[10] https://www.nature.scot/doc/guidance-note-6-guidance-support-offshore-wind-applications-marine-ornithology-impact-pathways

[11] https://www.nature.scot/doc/guidance-note-7-guidance-support-offshore-wind-applications-marine-ornithology-advice-assessing

be very small relative to their total migration route and would have an inconsequential effect (see **Section 3.2.4** of **Appendix 2 - HRA: HRA Screening Technical Report**).

4.2.1.2 Artificial lighting impact pathways during construction and operation

32. The impact pathway of negative impacts from artificial lighting were screened out for SPAs and Ramsar sites with migratory species features due to no evidence to suggest that these species show any attraction or avoidance of artificial lighting. This impact pathway was also screened out for SPAs and Ramsar sites with wintering waterfowl features and breeding red-throated diver features due to no evidence to suggest that these species show any attraction or avoidance of artificial lighting.

33. Additionally, this impact pathway was also screened out for SPAs with breeding seabird qualifying features, with the exception of SPAs with European storm petrel, Manx shearwater or puffin qualifying features. Most seabirds appear to show no attraction to artificial lighting. However, Procellariformes (shearwaters and petrels) and puffin fledglings do show evidence of being attracted to artificial lighting (Deakin *et al*., 2022; Furness, 2018). Whilst Leach's petrels do show evidence of being attracted to artificial lighting, theoretical connectivity was not established between the offshore Project area and any SPAs with Leach's petrel qualifying features, due to no Leach's petrels being recorded in the OAA plus 4 km buffer on any of the 27 digital aerial surveys.

34. Puffin fledglings are known to be attracted to light when they first leave the burrow and take their first flight to the sea. However, unlike the Procellariformes, once fledged, puffins do not show any attraction to or avoidance of artificial lighting. Therefore, there is an impact pathway for puffin fledglings to be negatively impacted by artificial lighting for SPAs very close to the offshore Project area. Puffins fledging at SPAs at a greater distance from the offshore Project area will not be attracted to the offshore Project area. Therefore, all SPAs with puffin qualifying features were screened out for this impact pathway, with the exception of Sule Skerry and Sule Stack SPA. This SPA is only 1.7 km from the boundary of the OAA and so puffin fledglings from this SPA could be attracted to artificial lighting in the offshore Project area during both construction and operation.

4.2.1.3 Collision and displacement impact pathways during operation

35. During Project operation, impact pathways of collision and displacement/barrier effects were screened out for SPAs with breeding seabird qualifying features (including red-throated diver) and wintering waterbird qualifying features, according to their typical flight heights and evidence of being displaced by OWF and/or the presence of vessels. SPAs with gannet and kittiwake features were screened in for both collision and displacement impacts, SPAs with gull, skua and tern features were screened in for collision and SPAs with auk and fulmar features for displacement.

36. The impact pathways that could not be screened out are presented in **Table 4-2**.

Table 4-2. Summary of impact pathways for which LSE could be ruled out ('N', i.e. no LSE) or could not be ruled out ('Y', i.e. LSE was established) during Project construction, operation and decommissioning, for different types of SPA qualifying features.

		Type of SPA qualifying feature					
Impact pathway	Potential impacts	Breeding seabird features in the breeding season	Breeding seabird features in the non-breeding season	Inshore wintering waterfowl features	Marine SPAs supporting breeding seabird features	Marine SPAs supporting breeding red-throated diver features	Migratory species (excluding seabirds) features
Construction and decommissioning							
1. Disturbance and/or displacement	Visual, noise or vibration disturbance due to construction within offshore Project area including the offshore export cable corridor and vessel movements outwith the offshore Project area, to and from port.	Y	Y	Y	Y	Y	N
2. Direct and indirect impacts on prey or supporting habitat	Disturbance and/or displacement of prey due to visual, noise or vibration disturbance. Loss of habitat for prey due to temporary or permanent infrastructure. Sedimentation impacts on ability of birds to forage, or on prey species.	Y	Y	Y	Y	Y	N
3. Lighting impacts from construction vessels	Displacement, attraction or disorientation.	Y	Y	N	Y	N	N
Operation							
4. Collision risk	Injury and mortality	Y	Y	N	Y	N	Y
5. Disturbance and/or displacement (including barrier effects)	Visual or noise disturbance around WTGs, other infrastructure or vessels resulting in direct habitat loss. Prevention or re-routing of foraging or commuting movements due to presence of turbines. Vessel movements outwith the offshore Project area, to and from port.	Y	Y	Y	Y	Y	N

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		Type of SPA qualifying feature					
Impact pathway	Potential impacts	Breeding seabird features in the breeding season	Breeding seabird features in the non-breeding season	Inshore wintering waterfowl features	Marine SPAs supporting breeding seabird features	Marine SPAs supporting breeding red-throated diver features	Migratory species (excluding seabirds) features
6. Direct and indirect impacts on prey or supporting habitat	Noise or electro-magnetic field impacts on prey species. Creation of hard substrates for prey species. Changes in water flow or suspended sediment levels due to permanent infrastructure	Y	Y	Y	Y	Y	N
7. Lighting impacts from turbines and vessels	Displacement, attraction or disorientation.	Y	Y	N	Y	N	N

37. A further breakdown of impact pathways for individual seabird species, breeding red-throated divers and wintering waterfowl is provided in **Table 4-3**. Disturbance and displacement occurring during construction (Impact Pathway 1) was broken down into (i) disturbance/displacement from construction of the Project within the OAA; (ii) export cable installation within the ECC; and (iii) vessels in transit outwith the offshore Project area. Disturbance and displacement occurring during operation (Impact Pathway 5) was also broken down into impacts occurring in the OAA, the ECC and vessels in transit outwith the offshore Project area.

38. During construction, disturbance and displacement could impact breeding seabird features of SPAs for which theoretical connectivity exists. For Arctic tern, theoretical connectivity was established only for the ECC and the Pentland Firth Islands SPA and not for the OAA and any SPAs, due to the short foraging range of this species. Also, Arctic terns were not present in the OAA plus 4 km buffer on any of the digital aerial surveys flown in the non-breeding season. Consequently, Arctic tern was screened in solely for disturbance/displacement impacts (Impact 1) and changes to prey (Impact 2) within the ECC and not for any other impact pathways (**Table 4-3**).

39. LSE was established for different SPAs during construction and during operation, due to displacement/disturbance from vessels in transit outwith the OAA. During construction, disturbance/displacement impacts could arise from vessels transiting between the offshore Project area and construction ports, with vessels transiting through marine SPAs (e.g. Scapa Flow SPA, Moray Firth SPA, Outer Firth of Forth and St Andrews Bay SPA). During operation, vessels transiting between the OAA and the Operations & Maintenance Base, which is presumed to be in Scrabster for this assessment, would transit through the marine extension of the North Caithness Cliffs SPA. Consequently, different qualifying features have the potential to be impacted by vessel movements during construction (breeding red-throated divers, wintering waterfowl as features of entirely marine SPAs) and operation (breeding seabird features of the North Caithness Cliffs SPA), as shown in **Table 4-3**.

40. Red-throated diver features have no connectivity with the OAA as they were recorded only very rarely within the OAA plus 4 km buffer during digital aerial surveys. However, export cable operations within the ECC, particularly where the cables make landfall, have the potential to impact red-throated divers from the Caithness and Sutherland Peatlands SPA which are foraging in the marine environment (see **Table 4-3**). Additionally, disturbance/displacement of breeding red-throated divers that are features of marine SPAs, e.g. Scapa Flow SPA, could also impact the functionally-linked Hoy SPA and Orkney Mainland Moors SPA which have breeding red-throated diver features.

41. It is assumed that construction of the Project has the potential to reduce prey abundance or availability within both the OAA and ECC and so any features with connectivity to either area could be impacted via this impact pathway. During operation, only species with connectivity to the OAA have the potential to be impacted by changes to prey abundance or availability, on the assumption that seabird prey remains largely unchanged within the ECC. Prey of wintering waterfowl and breeding red-throated divers within marine SPAs is assumed to be unaffected by vessels passing through an area on transit (see **Table 4-3**).

42. It is assumed that during operation, no activities in the ECC would impact any SPA qualifying features as any maintenance activities, such as cable inspections, would comprise only a single vessel which would only be in the area on an infrequent and temporary basis (see **Table 4-3**).

Table 4-3. Species-specific impact pathways for which LSE could not be ruled out, for SPAs with breeding seabird, red-throated diver and wintering waterfowl qualifying features for which theoretical connectivity with the Project exists. See text for more details.

Qualifying feature	CONSTRUCTION					OPERATION					
	Impact 1: Disturbance			Impact 2: Prey	Impact 3: Lighting	Impact 4: Collision	Impact 5: Displacement			Impact 6: Prey	Impact 7: Lighting
	OAA	ECC	Vessels in transit				OAA	ECC	Vessels in transit*		
Arctic tern		✓		✓							
European storm-petrel				✓	✓					✓	✓
Fulmar	✓	✓		✓			✓		✓	✓	
Gannet	✓	✓		✓		✓	✓			✓	
Great black-backed gull				✓		✓				✓	
Great skua				✓		✓				✓	
Guillemot	✓	✓		✓			✓		✓	✓	
Kittiwake	✓	✓		✓		✓	✓		✓	✓	
Manx shearwater				✓	✓					✓	✓
Puffin	✓	✓		✓	✓		✓		✓	✓	✓
Razorbill	✓	✓		✓			✓		✓	✓	
Breeding red-throated diver		✓	✓	✓						✓	
Wintering waterfowl			✓								
Migratory species (excluding seabirds)						✓					

* Only applies to features of North Caithness Cliffs SPA

43. The SPAs and Ramsar sites with breeding seabird features and/or breeding red-throated diver features and/or wintering waterfowl features, for which both theoretical connectivity and an impact pathway was established, i.e. for which LSE could not be ruled out, are listed in **Table 4-4**.

Table 4-4. List of SPA and Ramsar sites with breeding seabird features, breeding red-throated diver features and/or wintering waterfowl features, for which LSE could not be ruled out. For breeding seabird features of SPAs, whether connectivity with the OAA was in the breeding season (i.e. OAA plus 2 km buffer within foraging range of breeding seabird features of a site) or the non-breeding season (i.e. the SPA was in the UK North Sea BDMPS region) is indicated by an '✓'. The relevant impact pathway(s) for that site are indicated by an '✓'. BDMPS = Biological Defined Minimum Population Scales, after Furness (2015).

			Connectivity with OAA		Impact pathway		
SPA Name	Distance to OAA (km)	Qualifying Features	Breeding season	Non-breeding season	Displacement and/or collision in OAA	Disturbance from vessels	Impacts from lighting
Ailsa Craig	391.9	Breeding: Northern gannet, Lesser black-backed gull, Herring gull*, Black-legged kittiwake*, Common guillemot*	✓		✓		
Auskerry	77.6	Breeding: European storm-petrel, Arctic tern	✓		✓		✓
Buchan Ness to Collieston Coast SPA	199.4	Breeding: Northern fulmar*, European shag*, Herring gull*, Black-legged kittiwake*, Common guillemot*	✓	✓	✓		
Caithness and Sutherland Peatlands	22.9	Breeding: Red-throated diver, Black-throated diver, Eurasian wigeon, Common scoter, Hen harrier, Golden eagle, Merlin, European golden plover, Common greenshank, Wood sandpiper, Short-eared owl, Dunlin				✓	
Calf of Eday	72.3	Breeding: Northern fulmar*, Great cormorant*, Great black-backed gull*, Black-legged kittiwake*, Common guillemot*	✓	✓	✓		
Canna and Sanday	221.9	Breeding: European shag*, Herring gull*, Black-legged kittiwake*, Common guillemot*, Atlantic puffin*	✓	✓	✓		
Cape Wrath	25.9	Breeding: Northern fulmar*, Black-legged kittiwake*, Common guillemot*, Razorbill*, Atlantic puffin*	✓	✓	✓		
Copeland Islands	458.8	Breeding: Manx shearwater, Arctic tern	✓		✓		✓
Copinsay	67.2	Breeding: Northern fulmar*, Great black-backed gull*, Black-legged kittiwake*, Common guillemot*	✓	✓	✓		
Coquet Island	415.8	Breeding: Sandwich tern, Roseate tern, Common tern, Arctic tern. Seabird assemblage including Atlantic puffin.		✓	✓		

			Connectivity with OAA		Impact pathway		
SPA Name	**Distance to OAA (km)**	**Qualifying Features**	**Breeding season**	**Non-breeding season**	**Displacement and/or collision in OAA**	**Disturbance from vessels**	**Impacts from lighting**
East Caithness Cliffs	70.1	Breeding: Northern fulmar*, Great cormorant*, European shag, Peregrine falcon, Herring gull, Great black-backed gull*, Black-legged kittiwake, Common guillemot, Razorbill	✓	✓	✓		
Fair Isle	140.1	Breeding: Northern fulmar*, Northern gannet*, European shag*, Arctic skua*, Great skua*, Black-legged kittiwake*, Arctic tern, Common guillemot, Razorbill*, Atlantic puffin*, Fair Isle wren	✓	✓	✓		
Farne Islands	382.4	Breeding: Roseate tern, common tern, Arctic tern, Sandwich tern, common guillemot, Atlantic puffin*, European shag*, Great cormorant*, black-legged kittiwake*		✓	✓		
Fetlar	241.6	Breeding: Northern fulmar*, Whimbrel, Red-necked phalarope, Arctic skua*, Great skua, Arctic tern, Dunlin	✓	✓	✓		
Firth of Forth	295.1	Wintering: Red-throated diver, Great crested grebe*, Slavonian grebe , Great cormorant*, Pink-footed goose , Common shelduck , Eurasian wigeon*, Mallard*, Greater scaup*, Common eider*, Long-tailed duck*, Common scoter*, Velvet scoter*, Common goldeneye*, Red-breasted merganser*, Eurasian oystercatcher*, Ringed plover*, European golden plover , Grey plover*, Northern lapwing*, Red knot , Bar-tailed godwit , Eurasian curlew*, Common redshank , Ruddy turnstone, Dunlin* Passage: Sandwich tern				✓	
Firth of Tay and Eden Estuary	267.8	Wintering: Great cormorant*, Pink-footed goose, Greylag goose, Common shelduck*, Common eider*, Long-tailed duck*, Common scoter*, Velvet scoter*, Common goldeneye*, Red-breasted merganser*, Goosander*, Eurasian oystercatcher*, Grey plover*, Sanderling*, Bar-tailed godwit, Common redshank,				✓	

			Connectivity with OAA		Impact pathway		
SPA Name	**Distance to OAA (km)**	**Qualifying Features**	**Breeding season**	**Non-breeding season**	**Displacement and/or collision in OAA**	**Disturbance from vessels**	**Impacts from lighting**
		Black-tailed godwit*, Dunlin* Breeding: Eurasian marsh harrier, little tern					
Flamborough and Filey Coast	556.7	Breeding: Northern gannet, Black-legged kittiwake, Common guillemot, Razorbill, Northern Fulmar*	✓	✓	✓		
Flannan Isles	183.9	Breeding: Northern fulmar*, Leach's storm-petrel, Black-legged kittiwake*, Common guillemot*, Razorbill*, Atlantic puffin*	✓	✓	✓		✓
Forth Islands	301.9	Breeding: Northern gannet, Great cormorant*, European shag, Lesser black-backed gull, Herring gull*, Black-legged kittiwake*, Sandwich tern, Roseate tern, Common tern, Arctic tern, Common guillemot*, Razorbill*, Atlantic puffin	✓	✓	✓		
Foula	160.9	Breeding: Red-throated diver, Northern fulmar*, Leach's storm-petrel, European shag, Arctic skua*, Great skua, Black-legged kittiwake*, Arctic tern, Common guillemot, Razorbill*, Atlantic puffin	✓	✓	✓		
Fowlsheugh	236.8	Breeding: Northern fulmar*, Herring gull*, Black-legged kittiwake, Common guillemot, Razorbill*	✓	✓	✓		
Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island	660.3	Breeding: Manx shearwater, Red-billed chough Wintering: Red-billed chough	✓		✓		✓
Handa	56.1	Breeding: Northern fulmar*, Arctic skua, Great skua*, Black-legged kittiwake*, Common guillemot, Razorbill	✓	✓	✓		
Hermaness, Saxa Vord and Valla Field	257.7	Breeding: Red-throated diver, Northern fulmar*, Northern gannet, European shag*, Great skua, Black-legged kittiwake*, Common guillemot*, Atlantic puffin	✓	✓	✓		
Hoy	24.7	Breeding: Red-throated diver, Northern fulmar*, Peregrine falcon, Arctic skua*, Great skua, Great black-backed gull*, Black-legged kittiwake*, Common guillemot*, Atlantic puffin*	✓	✓	✓	✓	

			Connectivity with OAA		Impact pathway		
SPA Name	**Distance to OAA (km)**	**Qualifying Features**	**Breeding season**	**Non-breeding season**	**Displacement and/or collision in OAA**	**Disturbance from vessels**	**Impacts from lighting**
Inner Moray Firth	131.8	Wintering: Great cormorant*, Greylag goose, Eurasian wigeon*, Eurasian teal*, Greater scaup*, Common goldeneye*, Red-breasted merganser, Goosander*, Eurasian oystercatcher*, Black-tailed godwit, Eurasian curlew*, Common redshank Breeding: Osprey, Common tern				✓	
Irish Sea Front	558.6	Breeding: Manx shearwater	✓		✓		✓
Marwick Head	35.0	Breeding: Black-legged kittiwake*, Common guillemot	✓	✓	✓		
Mingulay and Berneray	282.5	Breeding: Northern fulmar*, European shag*, Black-legged kittiwake*, Common guillemot*, Razorbill, Atlantic puffin*	✓	✓	✓		
Moray Firth	79.2	Wintering: Red-throated diver, Great northern diver, Slavonian grebe, European shag, Greater scaup, Common eider, Long-tailed duck, Common scoter, Velvet scoter, Common goldeneye, Red-breasted merganser Breeding: European shag				✓	
Mousa	193.2	Breeding: European storm-petrel, Arctic tern	✓		✓		✓
North Caithness Cliffs	27.2	Breeding: Northern fulmar*, Peregrine falcon, Black-legged kittiwake*, Common guillemot, Razorbill*, Atlantic puffin*	✓	✓	✓	✓	
North Rona and Sula Sgeir	79.7	Breeding: Northern fulmar*, European storm-petrel, Leach's storm-petrel, Northern gannet, Great black-backed gull*, Black-legged kittiwake*, Common guillemot, Razorbill*, Atlantic puffin*	✓	✓	✓		✓
Northumberland Marine	363.2	Breeding: Sandwich tern, Roseate tern, Common tern, Arctic tern, Little tern, Common guillemot, Atlantic puffin. Seabird assemblage includes kittiwake		✓	✓		
Noss	206.3	Breeding: Northern fulmar*, Northern gannet, Great skua, Black-legged kittiwake*, Common guillemot, Atlantic puffin*	✓	✓	✓		
Orkney Mainland Moors	40.9	Breeding: Red-throated diver, Hen harrier, Short-eared owl Wintering: Hen harrier				✓	

			Connectivity with OAA		Impact pathway		
SPA Name	**Distance to OAA (km)**	**Qualifying Features**	**Breeding season**	**Non-breeding season**	**Displacement and/or collision in OAA**	**Disturbance from vessels**	**Impacts from lighting**
Outer Firth of Forth and St Andrews Bay Complex	266	Wintering: Red-throated diver, European shag, Slavonian grebe, Common eider, Long-tailed duck, Common scoter, Velvet scoter, Common goldeneye, Red-breasted merganser, Little gull, Black-headed gull, Common gull, Herring gull, Black-legged kittiwake, Common guillemot, Razorbill, Atlantic puffin Breeding: Manx shearwater, Northern gannet, European shag, Herring gull, Black-legged kittiwake, Common tern, Arctic tern, Common guillemot	✓	✓	✓	✓	✓
Pentland Firth Islands[1]	50.9	Breeding: Arctic tern	✓		✓		
Priest Island (Summer Isles)	108.2	Breeding: European storm-petrel	✓		✓		✓
Ronas Hill - North Roe and Tingon	219.2	Breeding: Red-throated diver, Great skua	✓	✓	✓		
Rousay	49.3	Breeding: Northern fulmar*, Arctic skua*, Black-legged kittiwake*, Arctic tern, Common guillemot*	✓	✓	✓		
Rum	212.2	Breeding: Red-throated diver, Manx shearwater, Golden eagle, Black-legged kittiwake*, Common guillemot*	✓	✓	✓		✓
Scapa Flow	31.2	Wintering: Great northern diver, Red-throated diver, Black-throated diver, Slavonian grebe, European shag, Common eider, Long-tailed duck, Red-breasted merganser				✓	
Seas off Foula	126.9	Breeding: Northern fulmar, Arctic skua, Great skua, Common guillemot, Atlantic puffin Wintering: Northern fulmar, Great skua, Common guillemot	✓	✓	✓		
Seas off St Kilda	197.1	Breeding: Northern fulmar, European storm-petrel, Northern gannet, Common guillemot, Atlantic puffin	✓		✓		✓

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			Connectivity with OAA		Impact pathway		
SPA Name	Distance to OAA (km)	Qualifying Features	Breeding season	Non-breeding season	Displacement and/or collision in OAA	Disturbance from vessels	Impacts from lighting
Shiant Isles	141.7	Breeding: Northern fulmar*, European shag, Black-legged kittiwake*, Common guillemot*, Razorbill, Atlantic puffin Wintering: Barnacle goose	✓	✓	✓		
Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro	780.4	Breeding: Manx shearwater, European storm-petrel, Lesser black-backed gull, Atlantic puffin, Short-eared owl, Red-billed chough, Razorbill*, Common guillemot*, Black-legged kittiwake*	✓		✓		✓
St Abb's Head to Fast Castle	337.6	Breeding: European shag, Herring gull, Black-legged kittiwake, Common guillemot, Razorbill		✓	✓		
St Kilda	249.8	Breeding: Northern fulmar*, Manx shearwater*, European storm-petrel, Leach's storm-petrel, Northern gannet, Great skua, Black-legged kittiwake*, Common guillemot*, Razorbill*, Atlantic puffin	✓	✓	✓		✓
Sule Skerry and Sule Stack	1.7	Breeding: European storm-petrel, Leach's storm-petrel, Northern gannet, European shag*, Common guillemot*, Atlantic puffin	✓	✓	✓		✓
Sumburgh Head	177.2	Breeding: Northern fulmar*, Black-legged kittiwake*, Arctic tern, Common guillemot*	✓	✓	✓		
Treshnish Isles	275.6	Breeding: European storm-petrel Wintering: Barnacle goose	✓		✓		✓
Troup, Pennan and Lion's Heads	160.1	Breeding: Northern fulmar*, Herring gull*, Black-legged kittiwake, Common guillemot, Razorbill*	✓	✓	✓		
West Westray	60.2	Breeding: Northern fulmar*, Arctic skua*, Black-legged kittiwake*, Arctic tern, Common guillemot, Razorbill*	✓	✓	✓		

			Connectivity with OAA		Impact pathway		
SPA Name	Distance to OAA (km)	Qualifying Features	Breeding season	Non-breeding season	Displacement and/or collision in OAA	Disturbance from vessels	Impacts from lighting
Ythan Estuary, Sands of Forvie and Meikle Loch	202.3	Wintering: Pink-footed goose, Common eider*, Northern lapwing*, Common redshank* Breeding: Sandwich tern, Common tern, Little tern				✓	

1. Theoretical connectivity with ECC only and not OAA as OAA is beyond foraging range for Arctic terns from Pentland Firth Islands SPA

4.3 SPA and Ramsar sites requiring Assessment

44. **Table 4-5** lists all SPAs and Ramsar sites for which LSE could not be ruled out, i.e. both theoretical connectivity and an impact pathway exists. The final list of sites carried through from stage one HRA Screening comprises 232 sites. This list includes all SPA and Ramsar sites listed in **Table 4-4** and in addition, includes all SPAs and Ramsar sites with migratory species qualifying features, which were screened in for LSE for collision impacts during operation. All 232 sites listed in **Table 4-5** were assessed for an adverse effect on site integrity arising from predicted Project impacts.

Table 4-5. List of all SPA and Ramsar sites for which LSE could not be ruled out and hence an Appropriate Assessment was required. 'Distance' is the distance, in km, from the site to the OAA boundary. Named components of assemblage features are indicated by '*'.

SPA Name	Distance (km)	Qualifying Features
Abberton Reservoir	836.6	Wintering: Great crested grebe, Mute swan, Eurasian wigeon, Gadwall, Eurasian teal, Northern shoveler, Common pochard, Tufted duck, Common goldeneye, Common coot Breeding: Great cormorant
Abernethy Forest	171.9	Breeding: Osprey, Western capercaillie, Scottish crossbill
Achanalt Marshes	132.6	Breeding: Wood sandpiper
Ailsa Craig	391.9	Breeding: Northern gannet, Lesser black-backed gull, Herring gull*, Black-legged kittiwake*, Common guillemot*
Aird and Borve, Benbecula	223.8	Breeding: Corncrake
Alde-Ore Estuary	819.6	Breeding: Eurasian marsh harrier, Pied avocet, Lesser black-backed gull, Sandwich tern, Little tern Wintering: Pied avocet, Ruff, Common redshank
Antrim Hills	412	Breeding: Hen harrier, Merlin
Arran Moors	346.5	Breeding: Hen harrier
Assynt Lochs	73.5	Breeding: Black-throated diver
Auskerry	77.6	Breeding: European storm-petrel, Arctic tern
Avon Valley	889.6	Wintering: Bewick swan, Gadwall
Bae Caerfyrddin / Carmarthen Bay	784.1	Wintering: Common scoter
Beinn Dearg	105.5	Breeding: Eurasian dotterel
Belfast Lough	458.6	Breeding: Common tern, Arctic tern Wintering: Bar-tailed godwit, Common redshank, Black-tailed godwit
Ben Alder	213.5	Breeding: Eurasian dotterel
Ben Wyvis	118.8	Breeding: Eurasian dotterel
Benfleet and Southend Marshes	861	Wintering: Ringed plover, Grey plover, Red knot , Dunlin , Dark-bellied brent goose
Berwyn	648.5	Breeding: Red kite, Hen harrier, Merlin, Peregrine falcon
Black Cart	322.9	Wintering: Whooper swan
Blackwater Estuary (Mid-Essex Coast Phase 4)	840.9	Breeding: Common pochard, Ringed plover, Little tern Wintering: Hen harrier, Ringed plover, Grey plover, Black-tailed godwit, Dunlin, Dark-bellied brent goose
Bluemull and Colgrave Sounds	242.9	Breeding: Red-throated diver
Bowland Fells	535.3	Breeding: Hen harrier, Merlin, Lesser black-backed gull

SPA Name	Distance (km)	Qualifying Features
Breydon Water	778.4	Wintering: Bewick swan, Pied avocet, European golden plover, Northern lapwing Breeding: Common tern Passage: Ruff
Bridgend Flats, Islay	350.2	Wintering: Barnacle goose
Broadland	756.7	Wintering: Bewick swan, Whooper swan, Eurasian wigeon, Gadwall, Northern shoveler, Hen harrier, Ruff Breeding: Great bittern, Eurasian marsh harrier
Buchan Ness to Collieston Coast SPA	199.4	Breeding: Northern fulmar*, European shag*, Herring gull*, Black-legged kittiwake*, Common guillemot*
Burry Inlet	790	Wintering: Common shelduck, Eurasian wigeon, Eurasian teal, Northern pintail, Northern shoveler, Eurasian oystercatcher, Grey plover, Red knot, Eurasian curlew, Common redshank, Ruddy turnstone, Dunlin
Caenlochan	210.8	Breeding: Golden eagle, Eurasian dotterel
Cairngorms	178.4	Breeding: Golden eagle, Osprey, Merlin, Peregrine falcon, Western capercaillie, Eurasian dotterel, Scottish crossbill
Caithness and Sutherland Peatlands	22.9	Breeding: Red-throated diver, Black-throated diver, Eurasian wigeon, Common scoter, Hen harrier, Golden eagle, Merlin, European golden plover, Common greenshank, Wood sandpiper, Short-eared owl, Dunlin
Caithness Lochs	40.1	Wintering: Whooper swan, Greylag goose, Greenland white-fronted goose
Calf of Eday	72.3	Breeding: Northern fulmar*, Great cormorant*, Great black-backed gull*, Black-legged kittiwake*, Common guillemot*
Cameron Reservoir	288.6	Wintering: Pink-footed goose
Canna and Sanday	221.9	Breeding: European shag*, Herring gull*, Black-legged kittiwake*, Common guillemot*, Atlantic puffin*
Cape Wrath	25.9	Breeding: Northern fulmar*, Black-legged kittiwake*, Common guillemot*, Razorbill*, Atlantic puffin*
Carlingford Lough	534.3	Breeding: Sandwich tern, Common tern Wintering: Light-bellied brent goose
Castle Loch, Lochmaben	409.9	Wintering: Pink-footed goose
Chesil Beach and The Fleet	909.9	Breeding: Little tern Wintering: Eurasian wigeon
Chew Valley Lake	833.2	Wintering: Northern shoveler
Chichester and Langstone Harbours	906.6	Wintering: Common shelduck, Eurasian wigeon, Eurasian teal, Northern pintail, Northern shoveler, Red-breasted merganser, Ringed plover, Grey plover, Sanderling, Bar-tailed godwit, Eurasian curlew, Common redshank, Ruddy turnstone, Dunlin, Dark-bellied brent goose Breeding: Sandwich tern, Common tern, Little tern
Coll	261.4	Wintering: Barnacle goose, Greenland white-fronted goose
Coll (corncrake)	271.9	Breeding: Corncrake
Coll and Tiree	253	Wintering: Great northern diver, Common eider
Colne Estuary (Mid-Essex Coast Phase 2)	837.9	Breeding: Common pochard, Ringed plover, Little tern, Dark-bellied brent goose Wintering: Hen harrier, Common redshank
Copeland Islands	458.8	Breeding: Manx shearwater, Arctic tern
Copinsay	67.2	Breeding: Northern fulmar*, Great black-backed gull*, Black-legged kittiwake*, Common guillemot*
Coquet Island	415.8	Breeding: Sandwich tern, Roseate tern, Common tern, Arctic tern. Seabird assemblage including Atlantic puffin.

SPA Name	Distance (km)	Qualifying Features
Creag Meagaidh	198.4	Breeding: Eurasian dotterel
Cromarty Firth	116.1	Wintering: Whooper swan, Greylag goose, Eurasian wigeon*, Northern pintail*, Greater scaup*, Red-breasted merganser*, Eurasian oystercatcher*, Bar-tailed godwit, Eurasian curlew*, Common redshank*, Red knot*, Dunlin* Breeding: Osprey, Common tern
Dengie (Mid-Essex Coast Phase 1)	847.1	Wintering: Hen harrier, Grey plover, Red knot, Dark-bellied brent goose
Din Moss - Hoselaw Loch	374.3	Wintering: Pink-footed goose, Greylag goose
Dornoch Firth and Loch Fleet	90	Wintering: Greylag goose, Eurasian wigeon, Eurasian teal*, Greater scaup*, Eurasian oystercatcher*, Bar-tailed godwit, Eurasian curlew*, Common redshank*, Dunlin* Breeding: Osprey*
Dorset Heathlands	888.7	Breeding: European nightjar, Wood lark, Dartford warbler Wintering: Hen harrier, Merlin
Drumochter Hills	206.4	Breeding: Merlin, Eurasian dotterel
Dungeness, Romney Marsh and Rye Bay	922	Wintering: Greater white-fronted goose, Eurasian wigeon, Gadwall, Common pochard, Little grebe, Great crested grebe, Great cormorant, Common coot, Northern lapwing, Sanderling, Whimbrel, Common sandpiper, Great bittern, Bewick swan, Northern shoveler, Hen harrier, European golden plover, Ruff Breeding: Eurasian marsh harrier, Pied avocet, Mediterranean gull, Sandwich tern, Common tern, Little tern Passage: Aquatic warbler
Dyfi Estuary / Aber Dyfi	691.5	Wintering: Greenland white-fronted goose
East Caithness Cliffs	70.1	Breeding: Northern fulmar*, Great cormorant*, European shag, Peregrine falcon, Herring gull, Great black-backed gull*, Black-legged kittiwake, Common guillemot, Razorbill
East Mainland Coast, Shetland	204	Wintering: Great northern diver, Slavonian grebe Breeding: Red-throated diver
East Sanday Coast	81.5	Wintering: Purple sandpiper, Bar-tailed godwit, Ruddy turnstone
Eilean na Muice Duibhe (Duich Moss)	355.1	Wintering: Greenland white-fronted goose
Elenydd – Mallaen	708.6	Breeding: Red kite, Merlin
Eoligarry, Barra	259.4	Breeding: Corncrake
Exe Estuary	901.1	Wintering: Slavonian grebe, Eurasian oystercatcher, Pied avocet, Grey plover, Black-tailed godwit, Dunlin, Dark-bellied brent goose
Fair Isle	140.1	Breeding: Northern fulmar*, Northern gannet*, European shag*, Arctic skua*, Great skua*, Black-legged kittiwake*, Arctic tern, Common guillemot, Razorbill*, Atlantic puffin*, Fair Isle wren
Fala Flow	338.1	Wintering: Pink-footed goose
Falmouth Bay to St Austell Bay	938.8	Wintering: Black-throated diver, Great northern diver, Slavonian grebe
Farne Islands	382.4	Breeding: Roseate tern, common tern, Arctic tern, Sandwich tern, common guillemot, Atlantic puffin*, European shag*, Great cormorant*, black-legged kittiwake*
Fetlar	241.6	Breeding: Northern fulmar*, Whimbrel, Red-necked phalarope, Arctic skua*, Great skua, Arctic tern, Dunlin
Firth of Forth	295.1	Wintering: Red-throated diver, Great crested grebe*, Slavonian grebe , Great cormorant*, Pink-footed goose , Common shelduck , Eurasian wigeon*, Mallard*, Greater scaup*, Common eider*, Long-tailed duck*, Common scoter*, Velvet scoter*, Common goldeneye*, Red-breasted merganser*, Eurasian oystercatcher*, Ringed plover*, European golden plover , Grey plover*, Northern

SPA Name	Distance (km)	Qualifying Features
		lapwing*, Red knot , Bar-tailed godwit , Eurasian curlew*, Common redshank , Ruddy turnstone, Dunlin* Passage: Sandwich tern
Firth of Tay and Eden Estuary	267.8	Wintering: Great cormorant*, Pink-footed goose, Greylag goose, Common shelduck*, Common eider*, Long-tailed duck*, Common scoter*, Velvet scoter*, Common goldeneye*, Red-breasted merganser*, Goosander*, Eurasian oystercatcher*, Grey plover*, Sanderling*, Bar-tailed godwit, Common redshank, Black-tailed godwit*, Dunlin* Breeding: Eurasian marsh harrier, little tern
Flamborough and Filey Coast	556.7	Breeding: Northern gannet, Black-legged kittiwake, Common guillemot, Razorbill, Northern Fulmar*
Flannan Isles	183.9	Breeding: Northern fulmar*, Leach's storm-petrel, Black-legged kittiwake*, Common guillemot*, Razorbill*, Atlantic puffin*
Forest of Clunie	222.9	Breeding: Hen harrier, Osprey , Merlin , Short-eared owl
Forth Islands	301.9	Breeding: Northern gannet, Great cormorant*, European shag, Lesser black-backed gull, Herring gull*, Black-legged kittiwake*, Sandwich tern, Roseate tern, Common tern, Arctic tern, Common guillemot*, Razorbill*, Atlantic puffin
Foula	160.9	Breeding: Red-throated diver, Northern fulmar*, Leach's storm-petrel, European shag, Arctic skua*, Great skua, Black-legged kittiwake*, Arctic tern, Common guillemot, Razorbill*, Atlantic puffin
Foulness (Mid-Essex Coast Phase 5)	860	Wintering: Hen harrier, Eurasian oystercatcher, Pied avocet, Grey plover, Red knot, Bar-tailed godwit, Common redshank, Dark-bellied brent goose Breeding: Pied avocet, Ringed plover, Sandwich tern, Common tern, Little tern
Fowlsheugh	236.8	Breeding: Northern fulmar*, Herring gull*, Black-legged kittiwake, Common guillemot, Razorbill*
Gibraltar Point	690.6	Wintering: Grey plover, Sanderling, Bar-tailed godwit Breeding: Little tern
Gladhouse Reservoir	340.9	Wintering: Pink-footed goose
Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island	660.3	Breeding: Manx shearwater, Red-billed chough Wintering: Red-billed chough
Glen App and Galloway Moors	411.6	Breeding: Hen harrier
Glen Tanar	207.5	Breeding: Hen harrier, Osprey, Scottish crossbill Permanent: Western capercaillie
Greater Wash	584.6	Breeding: Sandwich tern, Common tern, Little tern Wintering: Red-throated diver, Common scoter, Little gull
Greenlaw Moor	354.6	Wintering: Pink-footed goose
Gruinart Flats, Islay	338.8	Breeding: Red-billed chough Wintering: Barnacle goose, Greenland white-fronted goose, Red-billed chough Passage: Pale-bellied brent goose
Hamford Water	838.1	Wintering: Common shelduck, Eurasian teal, Pied avocet, Ringed plover, Grey plover, Common redshank, Black-tailed godwit, Dark-bellied brent goose Breeding: Little tern
Handa	56.1	Breeding: Northern fulmar*, Arctic skua, Great skua*, Black-legged kittiwake*, Common guillemot, Razorbill

SPA Name	Distance (km)	Qualifying Features
Hermaness, Saxa Vord and Valla Field	257.7	Breeding: Red-throated diver, Northern fulmar*, Northern gannet, European shag*, Great skua, Black-legged kittiwake*, Common guillemot*, Atlantic puffin
Holburn Lake and Moss	377.5	Wintering: Greylag goose
Hornsea Mere	596.1	Breeding: Mute swan Wintering: Gadwall
Hoy	24.7	Breeding: Red-throated diver, Northern fulmar*, Peregrine falcon, Arctic skua*, Great skua, Great black-backed gull*, Black-legged kittiwake*, Common guillemot*, Atlantic puffin*
Humber Estuary	598.7	Wintering: Great bittern, Common shelduck*, Eurasian wigeon*, Eurasian teal*, Mallard*, Common pochard*, Greater scaup*, Common goldeneye*, Hen harrier, Eurasian oystercatcher*, Pied avocet, Ringed plover*, European golden plover, Grey plover*, Northern lapwing*, Red knot, Sanderling*, Bar-tailed godwit, Eurasian curlew*, Common redshank, Ruddy turnstone*, Black-tailed godwit, Dunlin, Dark-bellied brent goose* Breeding: Great bittern, Eurasian marsh harrier, Pied avocet, Little tern Passage: Ringed plover*, Grey plover*, Red knot, Sanderling*, Ruff, Whimbrel*, Common redshank, Common greenshank*, Black-tailed godwit, Dunlin
Inner Clyde Estuary	310.8	Wintering: Common redshank
Inner Moray Firth	131.8	Wintering: Great cormorant*, Greylag goose, Eurasian wigeon*, Eurasian teal*, Greater scaup*, Common goldeneye*, Red-breasted merganser, Goosander*, Eurasian oystercatcher*, Black-tailed godwit, Eurasian curlew*, Common redshank Breeding: Osprey, Common tern
Inverpolly, Loch Urigill and nearby Lochs	81.1	Breeding: Black-throated diver
Irish Sea Front	558.6	Breeding: Manx shearwater
Killough Bay	508	Wintering: Light-bellied brent goose
Kilpheder and Smerclate, South Uist	249.5	Breeding: Corncrake
Kintyre Goose Roosts	348.4	Wintering: Greenland white-fronted goose
Knapdale Lochs	312.5	Breeding: Black-throated diver
Laggan, Islay	354.5	Wintering: Barnacle goose, Greenland white-fronted goose
Lairg and Strath Brora Lochs	75.7	Breeding: Black-throated diver
Langholm - Newcastleton Hills	400	Breeding: Hen harrier
Larne Lough	445.4	Breeding: Mediterranean gull, Sandwich tern, Roseate tern, Common tern Wintering: Light-bellied brent goose
Lee Valley	821	Wintering: Great bittern, Gadwall, Northern shoveler
Lewis Peatlands	104.6	Breeding: Red-throated diver, Black-throated diver, Golden eagle, Merlin, European golden plover, Common greenshank, Dunlin
Lindisfarne	365.3	Wintering: Whooper swan, Greylag goose, Common shelduck, Eurasian wigeon, Common eider, Long-tailed duck, Common scoter, Red-breasted merganser, Ringed plover, European golden plover, Grey plover, Sanderling, Bar-tailed godwit, Common redshank, Dunlin, Light-bellied brent goose Breeding: Roseate tern, Little tern
Liverpool Bay / Bae Lerpwl	533.7	Wintering: Red-throated diver, Common scoter, Little gull, Red-breasted merganser*, Great cormorant*, Black-headed gull*,

SPA Name	Distance (km)	Qualifying Features
		Common gull*, Common eider*, Northern Fulmar*, Great black-backed gull*, Great crested grebe*, Common guillemot*, Northern gannet*, Atlantic puffin*, Herring gull*, Black-legged kittiwake*, Lesser black-backed gull*, Black-throated diver*, European shag*, Razorbill*, Velvet scoter* Breeding: Common tern, Little tern
Loch Ashie	154.8	Passage: Slavonian grebe
Loch Eye	110.7	Wintering: Whooper swan, Greylag goose
Loch Flemington	138.5	Breeding: Slavonian grebe
Loch Ken and River Dee Marshes	412.4	Wintering: Greylag goose, Greenland white-fronted goose
Loch Knockie and Nearby Lochs	176.9	Breeding: Slavonian grebe
Loch Leven	289.3	Wintering: Great cormorant, Whooper swan, Pink-footed goose, Gadwall, Eurasian teal, Northern shoveler, Common pochard, Tufted duck, Common goldeneye
Loch Lomond	299.4	Wintering: Greenland white-fronted goose Permanent: Western capercaillie
Loch Maree	131.4	Breeding: Black-throated diver
Loch of Inch and Torrs Warren	431.8	Wintering: Hen harrier, Greenland white-fronted goose
Loch of Kinnordy	244.3	Wintering: Pink-footed goose, Greylag goose
Loch of Lintrathen	241.1	Wintering: Greylag goose
Loch of Skene	210.5	Wintering: Greylag goose, Common goldeneye, Goosander
Loch of Strathbeg	181.9	Wintering: Sandwich tern, Whooper swan, Pink-footed goose, Greylag goose, Barnacle goose, Eurasian teal*, Common goldeneye*
Loch Ruthven	162.2	Breeding: Slavonian grebe
Loch Shiel	220	Black-throated diver
Loch Spynie	133.4	Wintering: Greylag goose
Loch Vaa	173.5	Breeding: Slavonian grebe
Lochnagar	210	Breeding: Eurasian dotterel
Lochs of Spiggie and Brow	181.8	Wintering: Whooper swan
Lough Foyle	426.7	Wintering: Whooper swan, Bar-tailed godwit, Light-bellied brent goose, Red-throated diver*, Great crested grebe*, Bewick swan*, Greylag goose*, Shelduck*, Eurasian teal*, Mallard*, Eurasian wigeon*, Common eider*, Red-breasted merganser*, Oystercatcher*, European golden plover*, Grey plover*, Northern lapwing*, Red knot*, Dunlin*, Eurasian curlew*, Common redshank*, Common greenshank*, Slavonian grebe*
Lough Neagh and Lough Beg	457.3	Wintering: Bewick swan, Whooper swan , Common pochard , Tufted duck , Common goldeneye , Little grebe*, Great crested grebe*, Great cormorant*, Greylag goose*, Shelduck*, Eurasian wigeon*, Gadwall*, Eurasian teal*, Mallard*, Northern shoveler*, Greater scaup*, Common coot* Breeding: Common tern
Lower Derwent Valley	575.2	Wintering: Bewick swan, Eurasian wigeon, Eurasian teal, European golden plover, Ruff Breeding: Northern shoveler
Martin Mere	579.3	Wintering: Bewick swan, Whooper swan, Pink-footed goose, Eurasian wigeon, Northern pintail
Marwick Head	35	Breeding: Black-legged kittiwake*, Common guillemot

SPA Name	Distance (km)	Qualifying Features
Medway Estuary and Marshes	872.4	Wintering: Red-throated diver*, Great crested grebe*, Great cormorant*, Bewick swan, Common shelduck, Eurasian wigeon, Eurasian teal, Mallard*, Northern pintail, Northern shoveler, Common pochard*, Hen harrier, Merlin, Eurasian oystercatcher, Pied avocet, Ringed plover, Grey plover, Red knot, Eurasian curlew, Common redshank, Common greenshank, Ruddy turnstone, Black-tailed godwit, Dunlin, Dark-bellied brent goose, Northern lapwing* Breeding: Pied avocet, Common tern, Little tern
Mersey Estuary	606.6	Wintering: Great crested grebe, Common shelduck, Eurasian wigeon, Eurasian teal, Northern pintail, European golden plover, Grey plover, Northern lapwing, Eurasian curlew, Common redshank, Black-tailed godwit, Dunlin Passage: Ringed plover, Common redshank
Mersey Narrows and North Wirral Foreshore	596.1	Wintering: Great cormorant*, Eurasian oystercatcher*, Grey plover*, Sanderling*, Bar-tailed godwit, Common redshank*, Red knot, Dunlin* Breeding: Common tern Passage: Little gull, Common tern
Migneint-Arenig-Dduallt	639.5	Breeding: Hen harrier, Merlin, Peregrine falcon
Mingulay and Berneray	282.5	Breeding: Northern fulmar*, European shag*, Black-legged kittiwake*, Common guillemot*, Razorbill, Atlantic puffin*
Minsmere-Walberswick	805.3	Breeding: Great bittern, Gadwall, Eurasian teal, Northern shoveler, Eurasian marsh harrier, Pied avocet, Little tern, European nightjar Wintering: Gadwall, Northern shoveler, Hen harrier, Greater white-fronted goose
Mointeach Scadabhaigh	205.4	Breeding: Red-throated diver, Black-throated diver
Monach Islands	228.4	Breeding: Barnacle goose, Little tern
Montrose Basin	247.1	Wintering: Pink-footed goose, Greylag goose, Common shelduck*, Eurasian wigeon*, Common eider*, Eurasian oystercatcher*, Common redshank, Red knot*, Dunlin*
Moray and Nairn Coast	128.6	Wintering: Pink-footed goose, Greylag goose, Eurasian wigeon*, Red-breasted merganser*, Eurasian oystercatcher*, Bar-tailed godwit, Common redshank , Dunlin* Breeding: Osprey
Moray Firth	79.2	Wintering: Red-throated diver, Great northern diver, Slavonian grebe, European shag, Greater scaup, Common eider, Long-tailed duck, Common scoter, Velvet scoter, Common goldeneye, Red-breasted merganser Breeding: European shag
Morecambe Bay and Duddon Estuary	492.8	Breeding: Lesser black-backed gull, Herring gull, Sandwich tern, Common tern, Little tern Wintering: Little egret, Whooper swan, European golden plover, Ruff, Bar-tailed godwit, Mediterranean gull, Great egret*, Eurasian spoonbill*, Light-bellied brent goose*, Eurasian wigeon*, Eurasian teal*, Mallard*, Ring-necked duck*, Common eider*, Common goldeneye*, Red-breasted merganser*, Great cormorant*, Northern lapwing*, Little stint*, Spotted redshank*, Common greenshank*, Black-headed gull*, Common gull*, Herring gull* Passage: Pink-footed goose, Common shelduck, Northern pintail, Eurasian oystercatcher, Ringed plover, Grey plover, Red knot, Sanderling, Eurasian curlew, Common redshank, Ruddy turnstone, Lesser black-backed gull, Black-tailed godwit, Dunlin

SPA Name	Distance (km)	Qualifying Features
Mousa	193.2	Breeding: European storm-petrel, Arctic tern
Muir of Dinnet	202.2	Wintering: Greylag goose
Muirkirk and North Lowther Uplands	354.3	Breeding: Hen harrier, Merlin, Peregrine falcon, European golden plover, Short-eared owl Wintering: Hen harrier
Nene Washes	735.4	Breeding: Gadwall, Garganey, Northern shoveler, Black-tailed godwit Wintering: Bewick swan, Eurasian wigeon, Gadwall, Eurasian teal, Northern pintail, Northern shoveler
Ness and Barvas, Lewis	105.6	Breeding: Corncrake
New Forest	883.7	Breeding: European honey-buzzard, Eurasian hobby, European nightjar, Wood lark, Dartford warbler, Wood warbler Wintering: Hen harrier
North Caithness Cliffs	27.2	Breeding: Northern fulmar*, Peregrine falcon, Black-legged kittiwake*, Common guillemot, Razorbill*, Atlantic puffin*
North Inverness Lochs	157.7	Breeding: Slavonian grebe
North Norfolk Coast	710.5	Breeding: Great bittern, Eurasian marsh harrier, Pied avocet, Sandwich tern, Common tern, Little tern Wintering: Pink-footed goose, Eurasian wigeon, Pied avocet, Red knot, Dark-bellied brent goose
North Orkney	46.2	Wintering: Great northern diver, Slavonian grebe, Velvet scoter
North Pennine Moors	438.9	Breeding: Hen harrier, Merlin, Peregrine falcon, European golden plover
North Rona and Sula Sgeir	79.7	Breeding: Northern fulmar*, European storm-petrel, Leach's storm-petrel, Northern gannet, Great black-backed gull*, Black-legged kittiwake*, Common guillemot, Razorbill*, Atlantic puffin*
North Sutherland Coastal Islands	24.5	Wintering: Barnacle goose
North Uist Machair and Islands	194.2	Breeding: Corncrake, Eurasian oystercatcher, Ringed plover, Common redshank, Dunlin Wintering: Barnacle goose, Ringed plover, Purple sandpiper, Ruddy turnstone
North York Moors	512.5	Breeding: Merlin, European golden plover
Northern Cardigan Bay / Gogledd Bae Ceredigion	652.9	Wintering: Red-throated diver
Northumberland Marine	363.2	Breeding: Sandwich tern, Roseate tern, Common tern, Arctic tern, Little tern, Common guillemot, Atlantic puffin. Seabird assemblage includes kittiwake
Northumbria Coast	362.7	Breeding: Little tern Wintering: Purple sandpiper, Ruddy turnstone
Noss	206.3	Breeding: Northern fulmar*, Northern gannet, Great skua, Black-legged kittiwake*, Common guillemot, Atlantic puffin*
Orkney Mainland Moors	40.9	Breeding: Red-throated diver, Hen harrier, Short-eared owl Wintering: Hen harrier
Oronsay and South Colonsay	320.1	Breeding: Red-billed chough, Corncrake Wintering: Red-billed chough
Otterswick and Graveland	234.1	Breeding: Red-throated diver
Ouse Washes	748	Wintering: Great cormorant, Mute swan, Bewick swan, Whooper swan, Eurasian wigeon, Gadwall, Eurasian teal, Northern pintail, Northern shoveler, Common pochard, Tufted duck, Hen harrier, Common coot, Ruff Breeding: Gadwall, Mallard, Garganey, Northern shoveler, Black-tailed godwit

SPA Name	Distance (km)	Qualifying Features
Outer Ards	460.7	Breeding: Arctic tern Wintering: Ringed plover, European golden plover, Ruddy turnstone, Light-bellied brent goose
Outer Firth of Forth and St Andrews Bay Complex	266	Wintering: Red-throated diver, European shag, Slavonian grebe, Common eider, Long-tailed duck, Common scoter, Velvet scoter, Common goldeneye, Red-breasted merganser, Little gull, Black-headed gull, Common gull, Herring gull, Black-legged kittiwake, Common guillemot, Razorbill, Atlantic puffin Breeding: Manx shearwater, Northern gannet, European shag, Herring gull, Black-legged kittiwake, Common tern, Arctic tern, Common guillemot
Outer Thames Estuary	776.9	Breeding: Common tern, Little tern Wintering: Red-throated diver
Pagham Harbour	916.1	Wintering: Ruff, Common tern, Little tern, Dark-bellied brent goose
Papa Stour	195.9	Breeding: Arctic tern, Ringed plover
Peak District Moors (South Pennine Moors Phase 1)	594.5	Breeding: Merlin, European golden plover, Short-eared owl
Pentland Firth Islands	50.9	Breeding: Arctic tern
Pettigoe Plateau	517.2	Breeding: European golden plover
Poole Harbour	906.2	Wintering: Little egret, Common shelduck, Pied avocet, Spoonbill, Black-tailed godwit, Dark-bellied brent goose*, Great cormorant*, Eurasian curlew*, Dunlin*, Common goldeneye*, Common pochard*, Red-breasted merganser*, Common redshank*, Spotted redshank*, Common greenshank*, Eurasian teal*, Black-headed gull* Breeding: Mediterranean gull, Sandwich tern, Common tern
Portsmouth Harbour	903.6	Wintering: Red-breasted merganser, Black-tailed godwit , Dunlin , Dark-bellied brent goose
Priest Island (Summer Isles)	108.2	Breeding: European storm-petrel
Rannoch Lochs	221.7	Breeding: Black-throated diver
Renfrewshire Heights	320.5	Breeding: Hen harrier
Ribble and Alt Estuaries	561.8	Wintering: Great cormorant, Bewick swan, Whooper swan, Pink-footed goose, Common shelduck, Eurasian wigeon, Eurasian teal, Northern pintail, Greater scaup, Common scoter, Eurasian oystercatcher, European golden plover, Grey plover, Northern lapwing, Red knot, Sanderling, Bar-tailed godwit, Eurasian curlew, Common redshank, Black-tailed godwit, Dunlin Breeding: Ruff, Black-headed gull, Lesser black-backed gull, Common tern Passage: Ringed plover, Sanderling, Whimbrel, Common redshank
Rinns of Islay	342	Breeding: Common scoter, Hen harrier, Corncrake, Red-billed chough Wintering: Red-billed chough, Greenland white-fronted goose Permanent: Whooper swan
River Spey - Insh Marshes	184.3	Breeding: Eurasian wigeon, Osprey, Spotted crake, Wood sandpiper Wintering: Whooper swan, Hen harrier
Ronas Hill - North Roe and Tingon	219.2	Breeding: Red-throated diver, Great skua

SPA Name	Distance (km)	Qualifying Features
Rousay	49.3	Breeding: Northern fulmar*, Arctic skua*, Black-legged kittiwake*, Arctic tern, Common guillemot*
Rum	212.2	Breeding: Red-throated diver, Manx shearwater, Golden eagle, Black-legged kittiwake*, Common guillemot*
Rutland Water	714.7	Wintering: Great crested grebe, Mute swan, Eurasian wigeon, Gadwall, Eurasian teal, Northern shoveler, Tufted duck, Common goldeneye, Goosander, Common coot
Salisbury Plain	845.2	Breeding: Eurasian hobby, Common quail, Stone-curlew Wintering: Hen harrier
Scapa Flow	31.2	Wintering: Great northern diver, Red-throated diver, Black-throated diver, Slavonian grebe, European shag, Common eider, Long-tailed duck, Red-breasted merganser
Seas off Foula	126.9	Breeding: Northern fulmar, Arctic skua, Great skua, Common guillemot, Atlantic puffin Wintering: Northern fulmar, Great skua, Common guillemot
Seas off St Kilda	197.1	Breeding: Northern fulmar, European storm-petrel, Northern gannet, Common guillemot, Atlantic puffin
Severn Estuary	788	Wintering: Bewick swan, Common shelduck, Gadwall, Common redshank, Greater white-fronted goose, Dunlin
Shiant Isles	141.7	Breeding: Northern fulmar*, European shag, Black-legged kittiwake*, Common guillemot*, Razorbill, Atlantic puffin Wintering: Barnacle goose
Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro	780.4	Breeding: Manx shearwater, European storm-petrel, Lesser black-backed gull, Atlantic puffin, Short-eared owl, Red-billed chough, Razorbill*, Common guillemot*, Black-legged kittiwake*
Slamannan Plateau	313.5	Wintering: Taiga bean goose
Sléibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	281.9	Breeding: Eurasian oystercatcher, Ringed plover, Common redshank, Dunlin Wintering: Barnacle goose, Ringed plover, Ruddy turnstone, Greenland white-fronted goose
Slieve Beagh - Mullaghfad - Lisnaskea	516.8	Breeding: Hen harrier
Solent and Southampton Water	890.1	Breeding: Mediterranean gull, Sandwich tern, Roseate tern, Common tern, Little tern Wintering: Eurasian teal, Ringed plover, Black-tailed godwit, Dark-bellied brent goose
Solway Firth	419.5	Wintering: Red-throated diver, Great cormorant*, Whooper swan, Pink-footed goose, Barnacle goose, Common shelduck*, Eurasian teal*, Northern pintail, Northern shoveler*, Greater scaup, Common scoter*, Common goldeneye*, Goosander*, Eurasian oystercatcher, European golden plover, Grey plover*, Northern lapwing*, Red knot, Sanderling*, Bar-tailed godwit, Eurasian curlew, Common redshank, Ruddy turnstone*, Black-headed gull*, Common gull*, Herring gull*, Dunlin* Passage: Ringed plover
Somerset Levels and Moors	846.5	Wintering: Bewick swan, Eurasian teal, European golden plover, Northern lapwing
Sound of Gigha	328.3	Wintering: Great northern diver, Slavonian grebe, Common eider, Red-breasted merganser
South Pennine Moors Phase 2	559.1	Breeding: Merlin, European golden plover, Short-eared owl

SPA Name	Distance (km)	Qualifying Features
South Tayside Goose Roosts	271.8	Wintering: Pink-footed goose, Greylag goose Breeding: Eurasian wigeon
South Uist Machair and Lochs	229.3	Wintering: Corncrake, Ringed plover, Sanderling, Common redshank, Little tern, Dunlin Breeding: Eurasian oystercatcher, Ringed plover
South West London Waterbodies	846.2	Wintering: Gadwall, Northern shoveler
St Abb's Head to Fast Castle	337.6	Breeding: European shag, Herring gull, Black-legged kittiwake, Common guillemot, Razorbill
St Kilda	249.8	Breeding: Northern fulmar*, Manx shearwater*, European storm-petrel, Leach's storm-petrel, Northern gannet, Great skua, Black-legged kittiwake*, Common guillemot*, Razorbill*, Atlantic puffin
Stodmarsh	898.7	Wintering: Great bittern, Eurasian wigeon*, Gadwall, Mallard*, Northern shoveler, Common pochard*, Tufted duck*, Hen harrier, Water rail*, Northern lapwing*, Common snipe*, Greater white-fronted goose* Breeding: Gadwall
Stour and Orwell Estuaries	823.6	Wintering: Great crested grebe*, Great cormorant*, Mute swan, Common shelduck*, Eurasian wigeon*, Gadwall*, Northern pintail, Greater scaup, Common goldeneye*, Ringed plover*, European golden plover, Grey plover, Northern lapwing*, Red knot, Eurasian curlew*, Common redshank, Ruddy turnstone*, Black-tailed godwit, Dunlin, Dark-bellied brent goose Breeding: Pied avocet Passage: Ringed plover*, Common redshank
Strangford Lough	473.1	Wintering: Red knot, Common redshank, Light-bellied brent goose , Bar-tailed godwit*, Black-tailed godwit*, Common coot*, Eurasian curlew*, Dunlin*, Common eider*, Gadwall*, Great crested grebe*, Greylag goose*, Common greenshank*, Common goldeneye*, European golden plover*, Grey plover*, Northern lapwing*, Mallard*, Oystercatcher*, Northern pintail*, Red-breasted merganser*, Common ringed plover*, Shelduck*, Northern shoveler*, Eurasian teal*, Ruddy turnstone*, Eurasian wigeon* Breeding: Sandwich tern, Common tern, Arctic tern
Strath Carnaig and Strath Fleet Moors	80.9	Breeding: Hen harrier
Sule Skerry and Sule Stack	1.7	Breeding: European storm-petrel, Leach's storm-petrel, Northern gannet, European shag*, Common guillemot*, Atlantic puffin
Sumburgh Head	177.2	Breeding: Northern fulmar*, Black-legged kittiwake*, Arctic tern, Common guillemot*
Switha	46.8	Wintering: Barnacle goose
Teesmouth and Cleveland Coast	482.1	Wintering: Red knot, Ruff, Gadwall*, Northern shoveler*, Sanderling*, Eurasian wigeon*, Northern lapwing*, Herring gull*, Black-headed gull* Breeding: Pied avocet, Common tern, Little tern Passage: Common redshank, Sandwich tern
Thames Estuary and Marshes	862	Wintering: Hen harrier, Pied avocet, Grey plover, Red knot, Common redshank, Black-tailed godwit, Dunlin
Thanet Coast and Sandwich Bay	890.2	Breeding: Little tern Wintering: European golden plover, Ruddy turnstone
The Dee Estuary	603.3	Wintering: Common shelduck, Eurasian teal, Northern pintail, Eurasian oystercatcher, Grey plover, Red knot, Bar-tailed godwit, Eurasian curlew, Common redshank, Black-tailed godwit, Dunlin

SPA Name	Distance (km)	Qualifying Features
		Breeding: Common tern, Little tern Passage: Sandwich tern, Common redshank
The Swale	880	Wintering: Gadwall*, Eurasian teal*, Eurasian oystercatcher*, Ringed plover*, Grey plover*, Eurasian curlew*, Common redshank, Dunlin, Dark-bellied brent goose
The Wash	692.7	Wintering: Bewick swan, Pink-footed goose, Common shelduck, Eurasian wigeon, Gadwall, Northern pintail, Common scoter, Common goldeneye, Eurasian oystercatcher, Grey plover, Red knot, Sanderling, Bar-tailed godwit, Eurasian curlew, Common redshank, Ruddy turnstone, Black-tailed godwit, Dunlin, Dark-bellied brent goose Breeding: Common tern, Little tern
Tiree (corncrake)	293.3	Breeding: Corncrake
Traeth Lafan/ Lavan Sands, Conway Bay	612.6	Wintering: Red-breasted merganser, Eurasian oystercatcher, Eurasian curlew, Common redshank Passage: Great crested grebe
Treshnish Isles	275.6	Breeding: European storm-petrel Wintering: Barnacle goose
Troup, Pennan and Lion's Heads	160.1	Breeding: Northern fulmar*, Herring gull*, Black-legged kittiwake, Common guillemot, Razorbill*
Upper Lough Erne	534.7	Wintering: Whooper swan
Upper Nene Valley Gravel Pits	744.9	Wintering: Great crested grebe*, Great cormorant*, Great bittern, Eurasian wigeon*, Gadwall, Mallard*, Northern shoveler*, Common pochard*, Tufted duck*, Common coot*, European golden plover, Northern lapwing*
West Coast of the Outer Hebrides	166.9	Wintering: Black-throated diver, Great northern diver, Slavonian grebe, Common eider, Long-tailed duck, Red-breasted merganser Breeding: Red-throated diver
West Inverness-shire Lochs	171.4	Breeding: Black-throated diver, Common scoter
West Westray	60.2	Breeding: Northern fulmar*, Arctic skua*, Black-legged kittiwake*, Arctic tern, Common guillemot, Razorbill*
Wester Ross Lochs	119.2	Breeding: Black-throated diver
Westwater	339.8	Wintering: Pink-footed goose
Ythan Estuary, Sands of Forvie and Meikle Loch	202.3	Wintering: Pink-footed goose, Common eider*, Northern lapwing*, Common redshank* Breeding: Sandwich tern, Common tern, Little tern

5 APPROACH TO ASSESSMENT

5.1 Qualitative vs quantitative assessments

45. The approach to undertaking an assessment for all SPAs and Ramsar sites screened into this **Addendum to the RIAA** report varied depending on the site's qualifying features and impact pathways. Where possible, a quantitative approach was followed but where information available to inform the assessment did not support this, a qualitative approach was used. In each case, the approach adopted was discussed and agreed with NatureScot and followed NatureScot online guidance notes and Project-specific advice received during pre- and post-application consultation meetings. **Table 5-1** lists the different impact pathways for which LSE could not be ruled out and the approach used to assessing those impacts on sites. The methods used in each case, and NatureScot advice and guidance on methods, are described in more detail below.

46. This section of the **Addendum to the RIAA** describes the methods and approaches used to assess the seven impact pathways listed below. The potential for these impact pathways to cause an AEoSI is then considered in **Section 6**, with the impact pathways being considered in the same order as they are presented in **Section 5** and in **Table 5-1**,

Table 5-1. List of impact pathways, the SPA features which were assessed for each impact pathway and whether a qualitative or quantitative approach was used in the assessment. See Table 4-3 and Table 4-4 for further details on which impact pathways have the potential to impact different SPA sites and features

Impact pathway	Potential impact due to Project construction, operation and decommissioning	SPA feature	Type of assessment
	Construction and decommissioning		
1. Disturbance and/or displacement	1a. Visual, noise or vibration disturbance/displacement due to construction of WTGs and other Project infrastructure within OAA	Breeding seabird features of SPAs using the OAA	Qualitative
	1b. Visual, noise or vibration disturbance/displacement on breeding seabirds and red-throated divers due to laying of export cables and other construction activities in the ECC	Breeding seabird and red-throated diver features of SPAs	Qualitative
	1c. Visual or noise disturbance/displacement of wintering waterfowl and breeding red-throated divers in marine SPAs due to vessels passing close to or through marine SPAs when transiting to and from construction port	Wintering waterfowl and breeding red-throated diver features of marine SPAs and functionally linked terrestrial SPAs	Qualitative but includes comprehensive review of bird distributions, vessel transit numbers and indicative vessel routes
2. Direct and indirect impacts on prey or supporting habitat	Disturbance and/or displacement of prey due to visual, noise or vibration disturbance in the offshore Project area from construction activities. Loss of habitat for prey due to temporary or	Breeding seabird and red-throated diver features using the	Qualitative

Impact pathway	Potential impact due to Project construction, operation and decommissioning	SPA feature	Type of assessment
	permanent infrastructure. Sedimentation impacts on ability of birds to forage, or on prey species.	offshore Project area	
3. Negative impacts from artificial lighting on Project infrastructure and vessels	Displacement, attraction or disorientation, resulting in a reduction in foraging efficiency and consequent demographic consequences	Breeding European storm petrel, Manx shearwater and puffin features of SPAs	Qualitative, including a review of the evidence for negative effects from artificial lighting
Operation			
4. Collision risk	4a. Injury and mortality	Breeding seabird features using the OAA	Quantitative using collision risk models for breeding seabirds; qualitative for in-combination impacts from Projects with a Scoping Opinion but no application submitted
	4b. Injury and mortality	Migratory species using the OAA	Qualitative, informed by strategic migratory collision risk work
5. Disturbance and/or displacement (including barrier effects)	5a. Visual or noise disturbance from WTGs, other infrastructure or vessels resulting in displacement from the OAA plus 2 km buffer	Breeding seabird features using the OAA plus 2 km buffer	Quantitative, using displacement matrix and SeabORD; qualitative for in-combination impacts from Projects with a Scoping Opinion but no application submitted;
	5b. Prevention or re-routing of foraging or commuting movements due to presence of WTGs (i.e. barrier effects)	Breeding seabird features using the OAA	Quantitative, using displacement matrix and SeabORD
	5c. Visual or noise disturbance from vessels transiting between the OAA and the Operations & Maintenance base (presumed to be Scrabster for assessment)	Breeding seabird features using the marine extension of North Caithness Cliffs SPA	Qualitative
6. Direct and indirect impacts on prey or supporting habitat	Noise or electro-magnetic field impacts on prey species. Creation of hard substrates for prey species. Changes in water flow or suspended sediment levels due to permanent infrastructure	Breeding seabird features using the OAA	Qualitative
7. Negative impacts from artificial lighting on Project infrastructure and vessels	Displacement, attraction or disorientation, resulting in a reduction in foraging efficiency and consequent demographic consequences	Breeding European storm petrel, Manx shearwater and puffin features of SPAs	Qualitative, including a review of the evidence for negative effects from artificial lighting

5.2 Qualitative assessment of impact pathways occurring during construction and decommissioning

5.2.1 Impact Pathway 1: Disturbance and/or displacement impacts

5.2.1.1 Impact Pathway 1a: Visual, noise or vibration disturbance/displacement due to construction of WTGs and other Project infrastructure within OAA

47. The construction stage of the offshore Project within the OAA includes installation of foundations, WTGs and OSPs, as well as laying inter-array cables and other operations. These operations have the potential to disturb birds and could cause displacement from construction areas.

48. LSE could not be ruled out for this impact pathway for sites with the following breeding seabird qualifying features that were within foraging range (breeding season) or within the UK North Sea BDMPS region (non-breeding season): fulmar, gannet, guillemot, kittiwake, puffin and razorbill (see **Table 4-3** for impact pathways for each species and **Table 4-4** for a list of all SPAs screened in for this impact pathway).

49. Digital aerial surveys of the OAA plus a 4 km buffer were carried out during July 2020 to September 2022, inclusive. These data provide a comprehensive baseline characterisation of the bird interests in the area. This information was used to undertake a qualitative assessment of the potential disturbance and displacement impacts of construction of the Project within the OAA on qualifying features using the OAA.

5.2.1.2 Impact Pathway 1b: Visual, noise or vibration disturbance/displacement on breeding seabirds and red throated divers due to laying of export cables and other construction activities in the ECC

50. Operations associated with cable laying within the ECC could cause disturbance to and displacement of birds. A 4 km wide section of the north of the ECC was covered by the digital aerial surveys of the OAA plus 4 km buffer. These data provide information on site characterisation for that part of the ECC. Assessment of the remaining part of the ECC was undertaken using digital aerial survey data collected by Pentland Floating Offshore Wind Farm project which covered part of the ECC (**Figure 5-1**). As for the OAA, a qualitative assessment was made of the potential for disturbance and displacement from export cable laying activities to negatively impact qualifying features using the ECC.

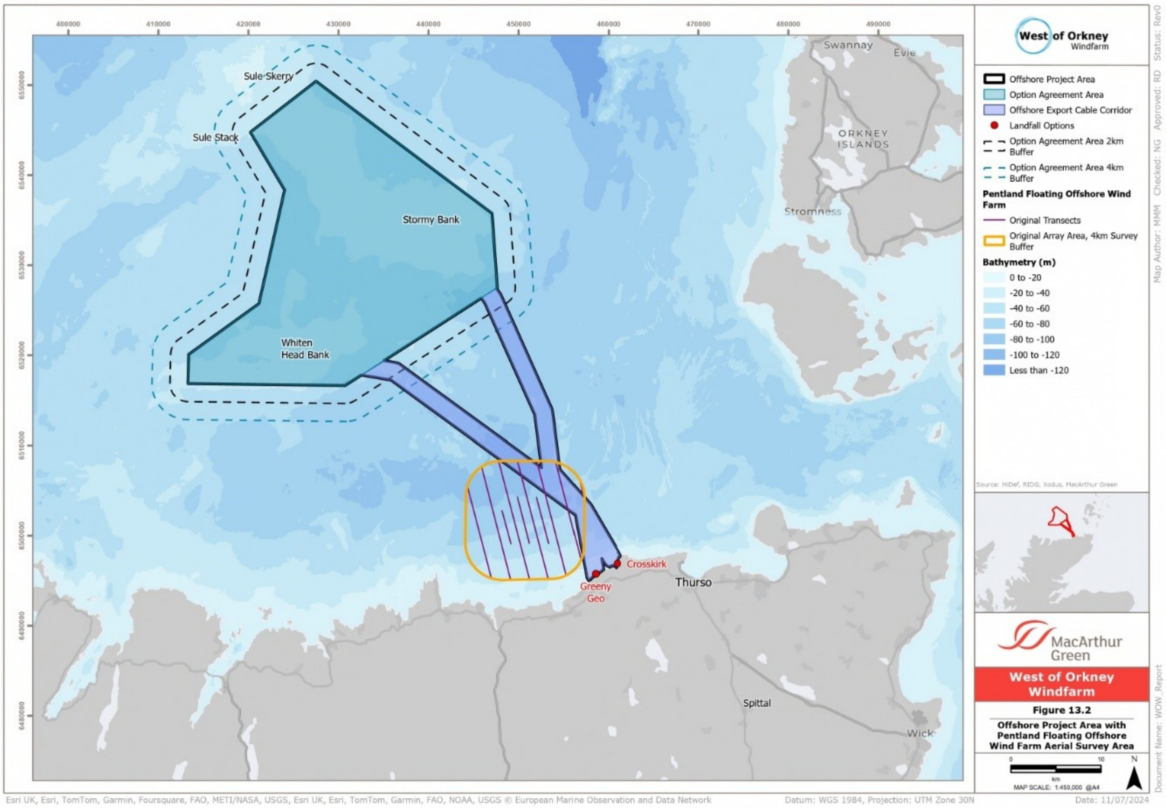


Figure 5-1. Offshore Project area, showing the coverage of the ECC with digital aerial surveys by the West of Orkney Windfarm and the Pentland Floating Offshore Wind Farm.

51. Operations associated with cable laying within the ECC could cause disturbance to and displacement of birds. The ECC is within foraging range of breeding red-throated divers, which are a qualifying feature of the Caithness and Sutherland Peatlands SPA. At its closest point, the SPA boundary is 6.9 km from the edge of the ECC (**Figure 5-2**). NatureScot Guidance Note 3 recommends a foraging range of 9 km to be used for red-throated diver. Therefore, the Caithness and Sutherland Peatlands SPA was assessed for impacts from operations associated with laying export cables on red-throated divers. A qualitative assessment was undertaken for this site and impact pathway.

52. The North Caithness Cliffs SPA (designated for breeding seabirds) has an extension into the marine environment. The marine bird qualifying features of this site (fulmar, guillemot, kittiwake, puffin, razorbill) are less sensitive to vessel traffic than divers and seaduck. As, the ECC and landfall sites of Crosskirk and/or Greeny Geo do not overlap with this SPA's marine extension, it was assumed there was no theoretical connectivity for this impact pathway and this site (**Figure 5-2**).

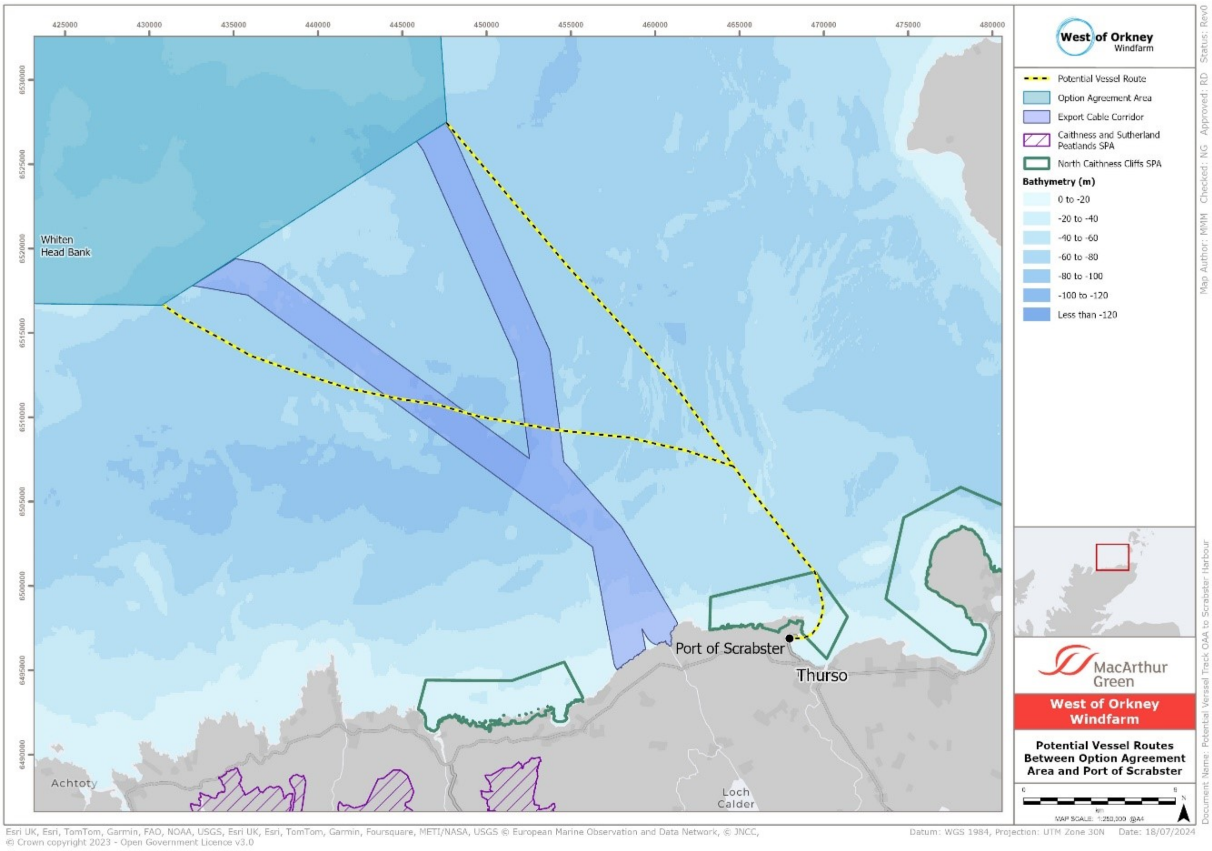


Figure 5-2.Map of the north coast of mainland Scotland showing where the ECC makes landfall in relation to the Caithness and Sutherland Peatlands SPA and the North Caithness Coast SPA.

5.2.1.3 *Impact Pathway 1c: Visual or noise disturbance/displacement of qualifying features in marine SPAs due to vessels passing close to or through marine SPAs when transiting to and from ports and harbours*

53. The offshore Project area, comprising the OAA and ECC, does not overlap with any marine SPAs. However, following NatureScot advice, including in their Guidance Note 4, marine SPAs with wintering waterfowl and breeding red-throated diver qualifying features were screened in for further assessment. This was due to vessels associated with construction activities, transiting between ports/harbours used for construction and the offshore Project area, potentially causing disturbance to and displacement of these qualifying features of marine SPAs.

54. Currently, the Project is not able to confirm which ports or harbours will be used for construction activities. Potential ports for marshalling and/or assembly are: Scapa Deep Water Quay, Port of Nigg, Port of Cromarty, Ardersier, Stornoway, Port of Leith or Port of Dundee. Additionally, Scrabster Harbour and Aberdeen Harbour are potential ports that could be used by the Project but for logistics only as they do not have facilities for marshalling or assembly of OWF components.

NatureScot Guidance Note 4 (2023):

Overview of connectivity to marine SPAs
For all inshore wintering waterfowl qualifying features of marine SPAs to determine LSE impact pathways need to be considered within 15km of the marine SPA.

This should be applied to all elements of proposed developments, including cable routes, wet storage locations, and routes for related vessel traffic (if known) to inform inclusion of marine SPA qualifying features within the long list. This allows for an audit trail for screening LSE, however, it is important that impact pathways that can affect features or habitat within the marine SPA even though they are more than 15km from the SPA boundary relevant at project level are considered even where these fall outside of the 15km buffer.

NatureScot Interim advice (13 December 2023):

From our review of the RIAA we note that disturbance from vessel movement has not been adequately considered. This impact pathway will cover construction and operation / maintenance activities and, while we understand that agreements have not yet been reached with individual Ports, we are concerned that North Orkney and Scapa Flow marine SPAs have been prematurely screened out – this concern was also raised during pre-application

55. **Figure 5-3** shows the location of ports that could be used for construction by the Project in relation to marine SPAs. Scapa Deep Water Quay, Port of Nigg, Port of Cromarty Firth, Ardersier, Port of Dundee and Port of Leith all have marine SPAs adjacent to them. This means that vessels associated with the Project would need to transit through the marine SPA to reach the port. Consequently, potential impacts from vessels associated with the Project on the Scapa Flow SPA, the Moray Firth SPA and the Outer Firth of Forth & St Andrews Bay Complex SPA are considered in detail below.

56. In addition, Scrabster Harbour could be used by some vessels associated with the Project during construction and operation and maintenance. Whilst no marine SPAs with divers, seaduck or grebe qualifying features are within 15 km of transit routes between Scrabster Harbour and the offshore Project area, a marine extension to the breeding seabird colony SPA of North Caithness Cliffs SPA does extend across Thurso Bay. Therefore, vessels entering and leaving Scrabster Harbour would transit through this SPA. Potential impacts from vessels associated with the Project on the North Caithness Cliffs SPA are considered in detail below.

57. Other ports that could be used by vessels associated with construction (e.g. Aberdeen) can be accessed without transiting through a marine SPA. In some cases, potential routes used by vessels transiting to/from these ports could travel within 15 km of other marine SPAs (**Figure 5-3**). Following NatureScot's Guidance Note 4, these SPAs were also screened in: Firth of Forth SPA, Firth of Tay and Eden Estuary SPA, Inner Moray Firth SPA, Ythan Estuary, Sands of Forvie and Meikle Loch SPA. Potential vessel impacts on these SPAs are also considered below. Note, vessels could transit within 15 km of Montrose Basin SPA but there is no direct

line of sight between the enclosed Montrose Basin and vessels at sea, so this SPA was screened out.

58. Finally, Scapa Flow SPA has breeding red-throated diver qualifying features. These features nest on Orkney, many of them within the Hoy SPA and the Orkney Mainland Moors SPA. As these two terrestrial SPAs are functionally linked to Scapa Flow SPA, any adverse effect on the marine SPA could also impact the terrestrial SPAs. Consequently, Hoy SPA and Orkney Mainland Moors SPA were screened in for this impact pathway.

59. NatureScot advised screening in the marine SPA of North Orkney SPA (interim advice of 13 December 2023). However, HRA screening found no theoretical connectivity with the offshore Project area, nor with vessels associated with the Project, either during construction or operation. Vessels will not routinely transit to/from Kirkwall or any other ports on the north side of Orkney and therefore will not pass within 15 km of the SPA. Therefore, impacts from vessels associated with the Project on the conservation objectives of this site were not assessed.

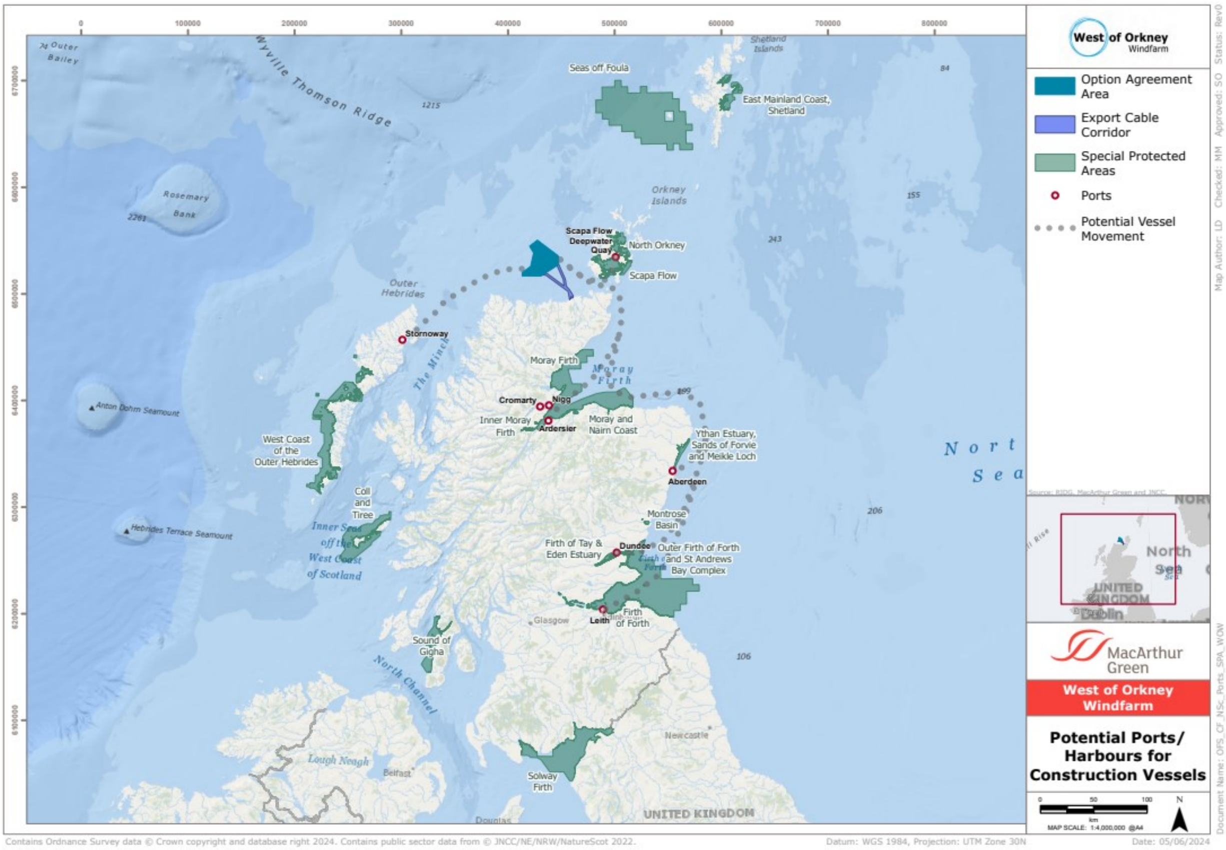


Figure 5-3. Map of Scotland showing the offshore Project area, marine SPAs, potential construction ports and indicative vessel routes that could be used by vessels associated with the Project.

60. Vessels will be required for decommissioning the Project, including operations such as removing WTGs, foundations, cables, etc. The levels of vessel activity are likely to be similar to or less than for construction and many operations will be of similar duration and require a similar number of vessel transits as required for construction.

61. At this stage it is not known which ports vessels associated with decommissioning will originate from and which transit routes these vessels might use. However, any impacts on SPAs identified for the construction phase of the Project are likely to be similar for the decommissioning phase. Consequently, no separate assessment was undertaken for any decommissioning impacts on Conservation Objectives of SPAs.

5.2.1.3.1 Assessment of vessel impacts

62. The approaches used to assess vessel impacts on SPA conservation objectives is summarised in **Table 5-2**.

Table 5-2. Approach to assessing vessel impacts arising during Project construction and decommissioning. Impacts are predicted to arise from vessels on transit between the port/harbour listed and the offshore Project area. See Figure 5-3 for indicative vessel routes and location of SPAs assessed.

Impact pathway	Port/harbour	SPAs requiring assessment	Approach to assessment
Vessels transiting within 15 km of marine SPAs with wintering waterfowl features, but not transiting through the SPA	Aberdeen, Dundee, Leith, Ardersier, Port of Cromarty, Port of Nigg	Firth of Forth SPA, Firth of Tay and Eden Estuary SPA, Inner Moray Firth SPA, Ythan Estuary, Sands of Forvie and Meikle Loch SPA.	Qualitative assessment that considers the proximity of vessels to the SPA boundary, the location of qualifying features within the SPA, the sensitivity of features to the presence of vessels and the potential for the presence of vessels to affect the site's conservation objectives
Vessels transiting through SPAs with breeding seabird features	Scrabster Harbour	North Caithness Cliffs SPA	Quantitative assessment of increase in vessel transits due to Project and potential for this to affect site's conservation objectives
Vessels transiting through SPAs with wintering waterfowl features and breeding red-throated diver features	Scapa Deep Water Quay, Port of Nigg, Port of Cromarty, Ardersier Port, Port of Dundee, Port of Leith	Scapa Flow SPA, Moray Firth SPA, Outer Firth of Forth and St Andrews Bay Complex SPA	Quantitative assessment of increase in vessel transits through SPA, indicative vessel routes, proportion of SPA potentially impacted, distribution of sensitive features of the site in relation to indicative vessel routes and potential for this to affect site's conservation objectives
SPAs with breeding red-throated diver features which are functionally linked to marine SPAs with vessels transiting through	Scapa Deep Water Quay	Hoy SPA, Orkney Mainland Moors SPA (functionally linked to Scapa Flow SPA)	Qualitative assessment of potential for any impacts to Scapa Flow SPA to affect the conservation objectives of terrestrial SPAs

5.2.1.3.2 Estimation of vessel impacts

63. MD-LOT advised, during a consultation meeting (26 February 2024), that this assessment should include information on additional vessel traffic that the Project will add to current/recent vessel activity levels in and around ports used by the Project.

64. NatureScot also advised in subsequent consultation meetings (24 June 2024 and 2 July 2024) that this assessment should include the following information:

- Estimated vessels numbers involved with construction of the Project;
- The relative increase in vessels numbers using ports;
- Indicative vessel transit routes;
- Indicative lie up and sheltering areas;
- An estimate of the percentage of the SPA populations that are likely to be impacted and the extent of the SPA impacted; and,
- Cumulative impacts with any other proposed developments within the Project timeframe.

65. Consequently, information was gathered on indicative vessel routes that vessels associated with the Project might use for ports/harbours that could be used by the Project during construction. Note, this includes both ports with capacity to handle OWF components, as well as ports/harbours that might be used for logistics and other support. Information on the Project construction programme was used to estimate the number of vessel transits made by different types of vessels during construction. Additionally, information on seaduck and diver qualifying feature abundance and distribution was also collated, to identify the most sensitive areas within marine SPAs.

66. NatureScot's advice indicated that their primary concern was around vessels transiting through marine SPAs with wintering waterfowl and breeding red-throated diver qualifying features, such as Scapa Flow SPA (see NatureScot interim advice of 13 December 2023 and NatureScot letter to the Project of 27 March 2024). Consequently, a quantitative assessment of potential increase in vessel traffic was undertaken for marine SPAs with wintering waterfowl and breeding red-throated diver features (i.e. Scapa Flow SPA, Moray Firth SPA and the Outer Firth of Forth and St Andrews Bay Complex SPA). For this, the increase in vessel traffic associated with ports that could potentially be used for construction was estimated, as vessels would need to transit through these marine SPAs that have features sensitive to vessels.

NatureScot Interim advice (13 December 2023):

From our review of the RIAA we note that disturbance from vessel movement has not been adequately considered. This impact pathway will cover construction and operation / maintenance activities and, while we understand that agreements have not yet been reached with individual Ports, we are concerned that North Orkney and Scapa Flow marine SPAs have been prematurely screened out – this concern was also raised during pre-application

NatureScot letter to the Project (27 March 2024):

In relation to reviewing the list of qualifying features that were assessed in the RIAA to confirm whether any other sites / features require assessment. As above we would also advise concluding yes LSE for Scapa Flow SPA, North Orkney SPA and West Mainland Moors SPA in relation to vessel disturbance.

67. **Table 5-2** shows that vessels associated with the Project may also transit through the North Caithness Coast SPA marine extension, while entering and leaving Scrabster Harbour. Note, that these would be vessels associated with logistical support during construction as Scrabster Harbour does not have the facilities for marshalling or assembly of OWF components. North Caithness Cliffs SPA supports breeding seabird features which are less sensitive to the presence of vessels than divers and seaduck (Furness *et al*. 2013). Estimating the increase in vessel activity at Scrabster Harbour during construction was very challenging as a range of different ports/harbours could be used for logical support during construction. However, an attempt was made to estimate the increase in vessel traffic at Scrabster Harbour during construction and carry out an assessment of the potential for any increase in vessel traffic transiting through the marine SPA to impact the sites conservation objectives.

68. Consequently, the quantitative assessment of Project vessels using different ports and harbours during construction focusses on vessels transiting to/from ports used for construction, i.e. marshalling or assembly of Project components.

5.2.1.3.3 Estimated numbers of vessel transits by different types of vessels

69. A range of vessels will be associated with construction of the offshore Project, undertaking activities including UXO survey and intervention, dredging and boulder removal, piling, installing scour protection, jacket and WTG installation, cable laying and rock/mattress protection placement. Other vessels will be required to transport personnel and infrastructure to the offshore Project area and to support these vessels, e.g. tugs, supply vessels, etc. Most vessels associated with construction of the Project will spend most of the time in the offshore Project area (i.e. within the OAA in which the turbines and other infrastructure will be constructed, or the ECC area). During construction, certain vessels will remain offshore for the entire season without entering any port and will therefore require regular servicing by offshore supply vessels. Other vessels will make regular port calls.

70. Information on numbers of vessels associated with construction of the Project was derived from the construction programme. This included:

- The operation required of the vessel (e.g. UXO survey, pile transport, etc.);

- The type of vessel, including typical speed and size (in metres);
- The number of transits per year (as a single journey, e.g. from construction port to the Project); and
- The year(s) of the construction programme when vessels will be active.

71. From this, a highly precautionary estimate of up to 3,444 one-way transits per year for all vessel types to/from any port/harbour was generated (see **Chapter 5: Project description of the Offshore EIA Report** for further details on construction programme). However, a large number of these transits will be between the offshore Project area (i.e. OAA and ECC) and ports or harbours providing logistical support, such as Scrabster, Aberdeen and other harbours. A very approximate estimate of 2,726 one-way transits per annum are assumed for ports/harbours providing logistical support during construction.

72. An estimated 718 one-way transits per annum are assumed for vessels using the following construction ports: Scapa Deep Water Quay, Leith, Dundee, Ardersier, Port of Cromarty or Port of Nigg) (**Table 5-3**). This is a worst case scenario estimate of the maximum possible number of transits per annum, based on precautionary assumptions. In reality, the number of vessel transits is highly likely to be less than this. Also, the maximum estimate of 718 transits per annum may be spread across more than one port, e.g. one port could be used for foundations and another for WTG assembly, depending on which ports the Project decides to use for construction.

Table 5-3. Maximum estimated number of transits (single journey) to/from a construction port by vessels associated with construction of the Project. A transit is a one-way journey, e.g. from port to the offshore Project area. Transits per year is the total number of transits for all vessels undertaking that operation, in a year, i.e. is a highly precautionary estimate.

Package	Operation	Vessel Type	Average Vessel Speed (knots (kts))	Vessel size L x B (m)	Transits per year	Construction Years Vessel Numbers are applicable for
Pile Installation (Jacket Piles)	Installation Vessel Supply & Stores	Multipurpose Vessel	8.5 kts	94 x 20	48	2,3,4
Jacket Installation	Jacket Transport	Barge or Self-Propelled Vessel	13 kts	225 x 68	64	2,3,4
Jacket Installation	Jacket Transport (Tug Assistance)	Ocean Going Tug	8 kts	73.5m x 16.4m	128	2,3,4
Jacket Installation	Installation Vessel Supply & Stores	Multipurpose Vessel	8.5 kts	94 x 20	48	2,3,4
Jacket Installation	Pile cleaning & Survey	Multipurpose Vessel	8.5 kts	94 x 20	48	2,3,4
WTG Installation	WTG Installation	Jack Up	10 kts	146 x 62	120	2,3,4,5
WTG Installation	WTG Component Transport	Transport Vessel	13 kts	225 x 68	262	2,3,4,5

5.2.1.3.4 Relative increase in vessel traffic at ports potentially used for construction

73. The worst case scenario estimated number of transits to or from a construction port, of 718 transits per annum, was then compared with 'baseline' port traffic, as advised by MD-LOT (26th February 2024). The number of vessels entering and exiting each of the construction ports was estimated using Automatic Identification System (AIS) data[12] from the Marine Management Organisation (MMO). A polygon was drawn around the entrance to each port, in GIS, and the number of AIS transits through the polygon was calculated. **Figure 5-4** shows the area used to sample the volume of vessel traffic arriving and departing from ports.

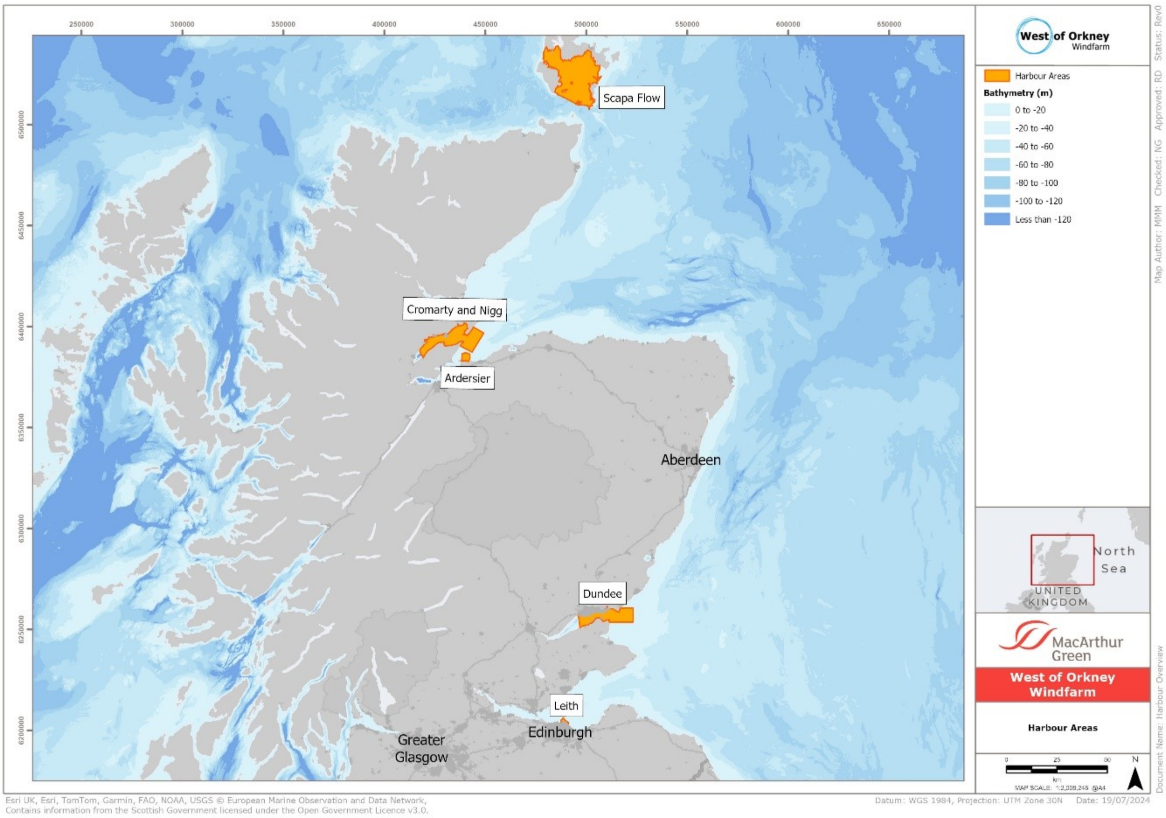


Figure 5-4. Defined harbour areas (in orange) used to sample the volume of vessel traffic arriving and departing from ports. For the ports of Scapa Flow and Port of Cromarty, the harbour authority limit area was used (Marine Scotland 2024 dataset, https://marine.gov.scot/maps/841). For all other ports, satellite imagery was used to visualise the harbour area between the breakwater boundaries.

74. The most recent AIS data released by the MMO is from 2019. **Table 5-4** shows the numbers of vessels assumed to be using the ports during 2015-2019, based on AIS records of transits through polygons adjacent to harbours and ports. Note, more recent data is not available from the MMO and, due to Covid-19 substantially reducing vessel traffic in 2020 and 2021, the data may not be reflective of the current baseline.

[12] https://environment.data.gov.uk/dataset/ffb7d2d8-2e13-487c-a17f-7abc0f116d50

Table 5-4. Estimated numbers of vessels arriving or departing from a port which the Project could use for construction, based on AIS data.

Port	Count of vessel tracks (all types) crossing into harbour area				
	2015	**2016**	**2017**	**2018**	**2019**
Scapa Flow, whole harbour area	9,308	17,334	16,714	48,359	51,298
Scapa Deep Water Quay	-	-	-	-	-
Nigg	307	330	139	828	895
Cromarty	109	34	35	73	63
Ardersier	0	0	0	0	148
Dundee	389	295	393	1,420	2,362
Leith	513	561	500	1,144	1,572

75. Numbers of vessels arriving and departing from ports substantially increased in 2018 and 2019 across all ports. It is suspected that this was due to an increase in the numbers of vessels carrying AIS transponders rather than an absolute increase in vessel numbers. Scapa Flow has a very high count of vessel tracks as the 'harbour area' was defined as the whole of Scapa Flow.

76. Ardersier and Scapa Deep Water Quay are not yet operational ports. Scapa Deep Water Quay is still in the planning process. Ardersier is currently under construction and the vessel movements for 2019 are likely construction vessels operating within the port.

77. The baseline number of port arrivals and departures was compared with the worst case estimate of numbers of Project vessels using each of the ports during construction, in the SPA-specific assessments in **Section 6**, below.

5.2.1.3.5 Indicative vessel transit routes through marine SPAs

78. NatureScot requested (consultation meetings of 24 June 2024 and 2 July 2024) that indicative vessel transit routes were provided for ports that might be used for construction of the Project. At this stage, it is not known which ports will be used during construction and so it is not possible to provide detail on vessel transit routes that Project vessels would use. However, construction vessels are all large slow-moving vessels (**Table 5-3**). Vessels range in size from 74 m up to 225 m in length and have a transit speed across the water of between 8-13 kts with most travelling at 10 kts or less. These types of vessels will need to follow existing vessel routes for navigational safety. Consequently, routes used by other vessels provide an indication of the routes that Project vessels would follow. Under each marine SPA appropriate assessment, AIS maps of vessel routes from 2019 are presented. Whilst for Scapa Deep Water Quay and the Port of Ardersier there are no existing vessel routes as these ports are not yet operational, vessels leaving these ports will transit to the closest existing route, for navigational safety.

5.2.1.3.6 Indicative lie up and sheltering areas

79. NatureScot also requested (consultation meetings of 24 June 2024 and 2 July 2024) that information on potential sheltering and lie-up areas that might be used by construction vessels within marine SPAs was provided. This is due to concerns that these vessels could

also cause disturbance to wintering waterfowl and breeding red-throated diver qualifying features of the marine SPAs and change the distribution of birds within the sites.

80. If a vessel needs to seek refuge in bad weather, the Master of the vessel will need to make a decision at the time on the safest action to take, prioritising navigational safety and the welfare of those on board the vessel. As this is a health and safety issue and the decision of the Master at the time, it is not possible to identify areas that would be used as refuges for this assessment. Any use of refuge sites will be temporary, for the duration of the period of foul weather.

81. The Project's construction programme does not intend that vessels are inactive for any significant periods of time so no planned lie-up is scheduled in. However, unforeseen delays could result in some vessels being inactive for short periods. If this event arises, vessels will generally wait in a port rather than lying up elsewhere, including within any marine SPA. Unlike some other industries (e.g. oil and gas) vessels associated with construction of OWFs do not routinely have extended periods of inactivity.

82. As the Project is not intending to use any sheltering or lie-up areas within marine SPAs for any length of time, this impact pathway was screened out and no indicative areas were provided in this assessment. It is also important to note that the Conservation and Management Advice for all three marine SPAs states that:

- Anchorages & moorings: Beyond pressures associated with the vessel traffic… we are not aware of any further pressures that have the potential to cause an adverse effect on the protected features (Table 3, Moray Firth SPA Conservation & Management Advice[13]).

5.2.1.3.7 Species' sensitivity to presence of vessels

83. Some species are more sensitive to the presence of vessels than others. For species that have a distribution that might overlap with Project vessel transit routes, the susceptibility of the species to disturbance was considered. Schwemmer *et al*., (2011) investigated flush distances from vessels by several species of diver and seaduck, within and outwith shipping lanes. Flush distances for the seaduck and diver species that were included in this study were described as: very high for common scoter, moderate to high for long-tailed duck, low to moderate for common eider, moderate to high for velvet scoter and very high for red-throated and black-throated divers. Flush distances were highly variable among individuals of the same species. Schwemmer *et al.*, (2011) also found that, unlike seaduck, divers did not habituate to vessels, showing no reduction in flushing distance in shipping lanes, compared to other areas.

84. Goodship & Furness (2022) undertook a review of flush distances of a range of species, including divers, grebes and seaduck, both during the breeding season and the non-breeding season. Divers are considered to have a high sensitivity to boat disturbance and human activity in marine areas during the non-breeding season. Red-throated and black-throated divers are considered to be particularly sensitive to marine activity, with red-throated divers more likely to take flight in response to marine activity, while black-throated divers tended to favour a swim or dive response (Jarrett *et al*., 2018). A protective buffer zone of at least 1

[13] SiteLink - Moray Firth SPA (nature.scot)

km has been suggested to protect red-throated and black-throated divers during the non-breeding season (Goodship & Furness, 2022).

85. Great northern divers are considered to have a medium/high response to human disturbance and a buffer zone up to 350 m has been suggested to protect this species during the non-breeding season (Goodship & Furness, 2022). This diver species has been identified as having a high vulnerability to disturbance by boats (Furness *et al*., 2013, Jarrett *et al.,* 2018), and may swim away from the path of ferries up to 4 km away (Jarrett *et al.,* 2018), although as great northern divers spend a high proportion of daylight hours foraging during the non-breeding season it may be difficult to distinguish between behaviours of diving to avoid nearby boats and diving to hunt for food. In contrast to red-throated and black-throated divers, which tend to avoid areas of human activity such as piers, harbours and ferry terminals, great northern divers can often be watched foraging under piers or in harbours, close to human activity, which suggests that this species, or at least some individuals, are less sensitive to human disturbance than are the smaller diver species (reviewed in Goodship & Furness, 2022).

86. Slavonian grebes are known to have a high sensitivity to boat disturbance (Jarrett *et al.,* 2018), a buffer zone up to 350 m has been suggested to protect this species during the non-breeding season (Goodship & Furness, 2022). However, flushing distances of individual birds depends on the extent of habituation and tolerance of disturbance in different areas (Ruddock and Whitfield, 2007), in Argyll, Orkney and Shetland, Slavonian grebes are known to overwinter in areas with frequent ferry and fishing vessel traffic, salmon and mussel farming activity (Argyll Bird Reports volumes 12 to 29[14], Upton *et al*., 2018; Jackson, 2018), and these populations appear to be tolerant of these practices.

87. Seaducks are considered to be sensitive to boat disturbance and human activity in marine areas during the non-breeding season (Goodship & Furness, 2022). Scoter are considered to be the most sensitive seaduck species in the UK. Common scoter may flush from boats that are over 3 km away (Schwemmer *et al.,* 2011). Goldeneye are also vulnerable to boat disturbance and a buffer up to 800 m has been suggested to protect this species during the non-breeding season (Goodship & Furness, 2022). However, in Orkney, goldeneye tend to overwinter in very sheltered coastal areas and inland lochs where marine activity is unlikely, and therefore this species has been considered to rarely come into contact with marine activity in Orkney (Jarrett *et al.,* 2018). Buffers of up to 450 m to 500 m have been suggested to protect greater scaup and common eider during the non-breeding season, both of these seaduck species are considered to have a high vulnerability to disturbance by boats (Furness *et al.,* 2013; Mendel *et al.,* 2008; Jarrett *et al.,* 2018), although flush distances vary between individuals, in different weather conditions and stage of moult. Long-tailed duck and red-breasted merganser were not reviewed by Goodship & Furness, 2022, but these seaduck species were considered to have a moderate disturbance susceptibility score similar to that of common eider and Slavonian grebe in a review by Bradbury *et al.* (2014).

88. It is important to note that all bird species are likely, to some degree, to habituate to disturbance, and birds present in highly disturbed areas (e.g. those within or close to shipping lanes) are more likely to show some habituation to disturbance and tolerate a shorter

[14] Argyll Bird Reports available at: https://argyllbirdclub.org/publications/the-argyll-bird-report/

disturbance than birds of the same species in less disturbed areas. As well as differing levels of habituation between individuals, a wide range of other factors (e.g. weather, flock size, bird age, etc.) can influence behavioural responses to disturbance and therefore response to vessel traffic is very likely to vary between individuals (reviewed in Goodship & Furness, 2022).

5.2.1.3.8 An estimate of the percentage of the SPA populations that are likely to be impacted and the extent of the SPA impacted

89. NatureScot also requested (consultation meetings of 24 June 2024 and 2 July 2024) that the extent of the SPA impacted, and percentage of SPA populations impacted, was estimated. To do this, the area over which vessel impacts could potentially influence behaviour of qualifying features, within the SPA, was estimated. This was defined as length of vessel track within the marine SPA boundary multiplied by the distance from the vessel track over which birds could potentially be disturbed by the presence of vessels.

90. To fulfil NatureScot's request, for ports that are not yet operational, hypothetical vessel routes from the Scapa Deep Water Quay and from the Port of Ardersier were assumed. The length of the vessel route, in kilometres, through the marine SPA (i.e. from the port to the SPA boundary) was calculated using GIS.

91. Evidence reviewed by Goodship & Furness (2022) suggests that most divers, seaduck and grebes tend to flush (i.e. take flight, dive or take other evasive action in response to the presence of a vessel) at a distance of less than 1 km. Under Scenario 1, a buffer of 1 km either side of the vessel track was applied to represent the maximum area in which birds could potentially be disturbed and possibly displaced by the presence of a vessel on transit. A second highly precautionary scenario (Scenario 2) was considered, which involved applying the 2 km buffer that is advised by NatureScot for OWFs, i.e. assuming a buffer of 2 km either side of the vessel track. The area of these two scenarios was calculated, i.e. length of vessel track within marine SPA x 2 km (Scenario 1) or x 4 km (Scenario 2) and the proportion of the total area of the marine SPA that this represents was derived.

92. The information on vessel transits through the SPA was then compared with the distribution of qualifying features of the SPA to determine whether the Project construction vessels would have the potential to cause disturbance and displacement of wintering waterfowl and breeding red-throated diver qualifying features of the sites. Information on the distribution of wintering waterfowl in the Scapa Flow SPA was obtained from NatureScot (Jackson, 2018[15]). For Moray Firth SPA and the Outer Firth of Forth and St Andrew's Bay Complex SPA, wintering bird distribution data was obtained from the Marine Directorate's National Marine Planning Interactive (NMPi) mapping tool[16].

[15] *NatureScot Research Report 1075 - Scapa Flow proposed Special Protection Area (pSPA) - inshore wintering waterfowl survey 2017/18 | NatureScot*

[16] *Marine Scotland - National Marine Plan Interactive (atkinsgeospatial.com)*

5.2.2 Impact Pathway 2: Direct and indirect impacts on prey or supporting habitat

93. Indirect disturbance and displacement of birds may occur during the construction stage if there are impacts on prey species and the habitats of prey species. These indirect impacts include those resulting from the production of underwater noise (e.g. during piling), temporary habitat loss and disturbance (e.g. during preparation of the seabed for foundations and cable installation) that may alter the behaviour or availability of bird prey species.

94. A qualitative assessment was undertaken of the potential for changes to prey abundance and/or availability to impact conservation objectives of sites for which LSE was concluded (**Table 4-3**) was undertaken and is presented in **Section 6**, below.

5.2.3 Impact Pathway 3: Negative impacts from artificial lighting on Project infrastructure and vessels

95. The following consultation advice on lighting impacts was given by NatureScot:

NatureScot Advice (27 March 2024):

It is noted from the RIAA (Section 6.7.4) that Manx shearwater, European storm-petrel and Leach's storm-petrel have been screened out from negative impacts from artificial lighting based on Furness (2018). This should be re-considered in light of recent published work and a new project relating to petrels and shearwaters:

- *Petrel and Shearwater Sensitivities to Offshore Wind farms – Evidence Review https://www.gov.scot/publications/review-inform-assessment-risk-collision-displacementpetrels-shearwaters-offshore-wind-developments-scotland/*
- *OWSMRF project KG4 - JNCC report 719 Towards better estimates of Manx shearwater and European storm-petrel population abundance and trends, demographic rates and at-sea distribution and behaviour*
- *ProcBe – Procellariiform Behaviours and Demographics https://jncc.gov.uk/aboutjncc/jncc-blog/archive/the-procbe-procellariiform-behaviour-and-demographics-project*

96. In addition to visual and noise impacts associated with construction activities, lighting of construction sites, vessels and other structures at night may potentially be a source of attraction (phototaxis), disorientation or displacement for birds. Thus, a review, based on Deakin *et al.*, (2022) *A review to inform the assessment of the risk of collision and displacement in petrels and shearwaters from offshore wind developments in Scotland* and Baker *et al.*, (2022) on behaviour and distribution of Manx shearwater and European storm-petrel has been conducted to assess the potential for this impact the conservation objectives of sites where either of these two species are qualifying features. This information was also supplemented by a review of this impact pathway undertaken for Dogger Bank South Offshore Windfarm (MacArthur Green, 2023).

97. NatureScot also advised using information from the OWEC-funded, JNCC-led ProcBE project. At present, this project is collecting new data and has not yet published any results or outputs that could be used to provide additional information in this assessment (*pers. comm.* JNCC).

98. As explained in **Appendix 2 – HRA: HRA Screening Technical Appendix**, Leach's petrels were not recorded during any of the 27 digital aerial surveys baseline surveys and so were presumed absent from the OAA plus 4 km buffer. Therefore, no SPAs were screened in for this impact pathway solely due to having Leach's petrel as a qualifying feature. Additionally, puffin fledglings can be attracted to artificial light at short distances, and so the SPA closest to the Project (Sule Skerry and Sule Stack SPA) where puffin is a qualifying feature, was screened in for this impact pathway.

99. The following SPAs were therefore screened in for assessment of negative impacts from artificial lighting associated with the Project during construction:

- For European storm-petrel: Auskerry, Mousa, North Rona and Sula Sgeir, Priest Island, Seas off St Kilda, Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro, St Kilda, Sule Skerry and Sule Stack, Treshnish Isles;
- For Manx shearwater: Copeland Islands, Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island, Irish Sea Front, Outer Firth of Forth and St Andrews Bay Complex, Rum, Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro, St Kilda;
- For puffin: Sule Skerry and Sule Stack SPA.

5.3 Qualitative assessment of impacts occurring during operation

5.3.1 Impact Pathway 4: Collision impacts on migratory features

100. A previous strategic level assessment of collisions on migratory qualifying features of SPAs (excluding seabirds) was completed for the Scottish Territorial Waters and Round 3 sites (in Scottish waters). More recently, the Scottish Government has funded work to:

- Undertake a strategic review of birds on migration in UK waters;
- Develop a stochastic collision risk model (CRM) tool for migratory species; and
- Undertake a strategic study of collision risk for ScotWind leasing sites for birds on migration in Scottish waters.

101. As of June 2024, the strategic review of birds on migration in UK waters had been published (Woodward et al. 2023). However, the stochastic CRM tool for migratory species (mCRM) and the strategic study of collision risk for ScotWind leasing sites for birds on migration had not been published.

102. NatureScot, in their letter dated 27 March 2024, advised using the updated strategic review (Woodward et al. 2023) for undertaking an assessment of collision impacts on migratory species:

NatureScot Advice (letter dated 27 March 2024):

Migratory species – an updated review of migratory routes and vulnerabilities across the UK has been published by Marine Directorate and The Crown Estate. This work also includes development of a stochastic migration CRM tool (known as mCRM) to enable quantitative assessment of risks to migratory SPA species including swans, geese, divers, seaduck and raptors. This updated review should be used.

103. The focus of the Woodward *et al.* (2023) strategic review was on 'non-seabird features of Special Protection Areas (SPAs) including swans, geese, ducks, waders, raptors and other non-passerines'. The review provides input parameters for collision risk modelling (CRM) for these species, as well as migratory routes. However, the strategic report does not provide any assessment of collision risk or collision mortality for these species.

104. Berwick Bank Wind Farm, in their application, undertook an update to the previous strategic assessment of collision for migratory species (WWT & MacArthur Green, 2014). In their RIAA[17], they updated the estimates produced by WWT & MacArthur Green (2014) to account for:

- OWFs included in the strategic assessment that have changed design parameters, e.g. fewer WTGs constructed, compared to what was assessed;
- Change in SNCB advice on avoidance rates to use in collision risk modelling; and
- Species not included in the strategic assessment.

105. During a consultation meeting (18 June 2024), NatureScot advised that the previous strategic assessment of migratory bird collision risk (WWT & MacArthur Green, 2014) should be considered alongside the new updated Woodward *et al.* (2023) report. NatureScot also accepted that a qualitative assessment was necessary, in the absence of the migratory collision risk modelling tool.

106. Therefore, a qualitative assessment was undertaken that considered the previous strategic assessment of migratory bird collision risk (WWT & MacArthur Green, 2014). This assessment from 2014 was partially updated by Berwick Bank Wind Farm in their RIAA[18]. The original and updated strategic assessments along with the Woodward et al. (2023) report, were used to make a qualitative evaluation of the potential for AEoSI for the SPAs with migratory qualifying features.

5.3.2 Impact Pathway 5: Disturbance, displacement and/or barrier effects during Project operation

107. This impact pathway was broken down into three different impacts, as was done for disturbance/displacement occurring during construction and decommissioning (see **Table 4-3**):

[18] 221220 - eor0766 berwick bank wind farm - riaa part 3 spa assessment - signed.pdf (marine.gov.scot)

- Impact Pathway 5a: Disturbance/displacement occurring in the OAA;
- Impact Pathway 5b: Disturbance/displacement occurring in the ECC;
- Impact Pathway 5c: Disturbance/displacement caused by Project vessels outwith the offshore Project area.

5.3.2.1 *Impact Pathway 5a: Disturbance/displacement occurring in the OAA during operation*

108. Disturbance/displacement impacts occurring in the OAA during Project operation were assessed quantitatively, using methods and tools that were recommended by NatureScot, e.g. the displacement matrix and SeabORD. Details of approaches used are provided below, in **Section 5.4.3.**

5.3.2.2 *Impact Pathway 5b: Disturbance/displacement occurring in the ECC*

109. During Project operation, displacement and disturbance impacts in the ECC will be very rare. Project vessels will not routinely operate in the ECC with any cable inspection, maintenance operations, and other work being infrequent and requiring only one or a very few vessels for a short period of time. Consequently, there would be no disturbance or displacement impacts occurring in the ECC during Project operation and this impact pathway requires no further assessment.

5.3.2.3 *Impact Pathway 5c: Visual or noise disturbance from vessels transiting between the OAA and the Operations & Maintenance base*

110. During operation, most vessel traffic will come from the Operations & Maintenance Base. At present, it is not confirmed where the O&M Base will be located but for the purposes of this assessment, it is assumed it will be in Scrabster. The transit route from Scrabster to the OAA would result in vessel traffic transiting through the marine extension of the North Caithness Cliffs SPA (**Figure 5-5**). A qualitative assessment was undertaken to assess the area of the SPA that could be impacted by transiting vessels and the extent to which seabirds features of the SPA, using that area, might be disturbed or displaced by the increase in vessel traffic during Project operation.

111. Vessel traffic using Scrabster Harbour could also increase during Project construction and decommissioning, which therefore has the potential to cause disturbance and displacement to breeding seabird qualifying features of the North Caithness Cliffs SPA. However, the increase in vessel traffic will be over a relatively short period compared with Project operation.

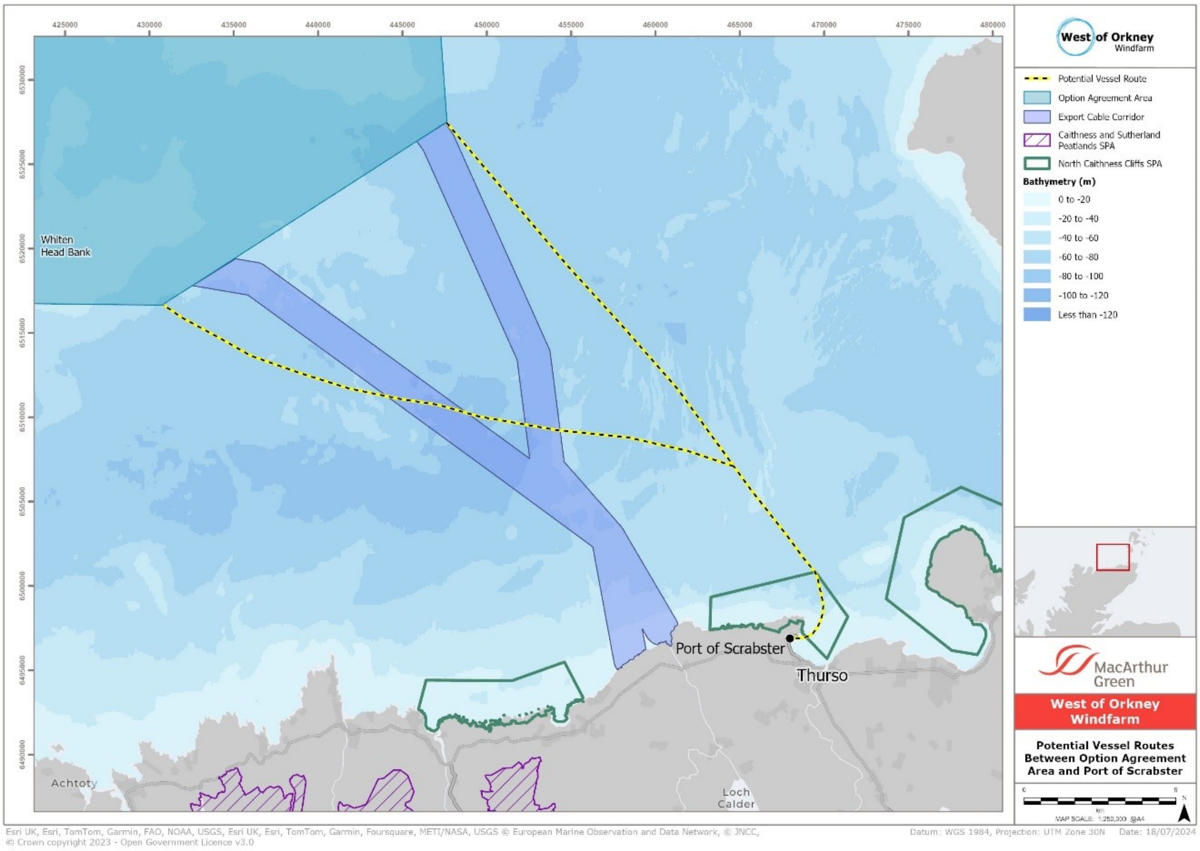


Figure 5-5. Map of the north coast of mainland Scotland showing indicative vessel routes (yellow dotted line) for operations and maintenance vessels transiting between the assumed O&M Base in Scrabster to/from the OAA, in relation to the marine extension of the North Caithness Cliffs SPA (green polygons).

5.3.3 Impact Pathway 6: Direct and indirect impacts on prey or supporting habitat

112. Presence of WTGs and other infrastructure, particularly subsea infrastructure, has the potential to alter prey communities and availability, e.g. changes to fish communities following introduction of hard structures. This has the potential to affect all species that are potentially foraging in the OAA and ECC.

113. A qualitative assessment was undertaken to consider the extent to which prey species available to marine bird qualifying features which are using the OAA could change and how this might impact the SPAs' conservation objectives.

5.3.4 Impact Pathway 7: Negative impacts from artificial lighting on Project infrastructure and vessels

114. Artificial lighting associated with the Project during operation is different to that during construction. During construction, there will be more vessels in the offshore Project area, with potential extensive lighting used to continue construction at night. During operation, other than occasional Project vessels in the OAA overnight, the only artificial light source will be navigational lighting on WTGs and OSPs.

115. The potential for this impact pathway to affect the conservation objectives of screened in sites is assessed below, through a qualitative review of the evidence for negative effects of

attraction to lighting in marine birds. Sources referred to in this review are the same as those outlined under Impact Pathway 3 for impacts of artificial lighting during construction (see **Section 5.2.3**).

116. Qualifying features potentially impacted by artificial lighting during operation are considered to be the same as those identified for Impact Pathway 3 during construction: Manx shearwater, European storm-petrel and puffin. The following SPAs (also considered to be the same as those identified for Impact Pathway 3) were screened in for assessment of for negative impacts from artificial lighting associated with the Project during operation:

- For European storm-petrel: Auskerry, Mousa, North Rona and Sula Sgeir, Priest Island, Seas off St Kilda, Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro, St Kilda, Sule Skerry and Sule Stack, Treshnish Isles;
- For Manx shearwater: Copeland Islands, Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island, Irish Sea Front, Outer Firth of Forth and St Andrews Bay Complex, Rum, Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro, St Kilda;
- For puffin: Sule Skerry and Sule Stack SPA.

5.4 Quantitative approach to assessing AEoSI from collision and displacement impact pathways within the OAA during operation

117. This section describes methods used to undertake a quantitative assessment of impacts on SPAs for Impact Pathway 4: Collision impacts on migratory features and Impact Pathway 5: Disturbance, displacement and/or barrier effects during Project operation.

5.4.1 Baseline Site Characterisation

118. Full details of the digital aerial survey (DAS) data collection and subsequent data analysis are provided in **Appendix 1 - EIA and HRA: Baseline Site Characterisation Technical Report**. Methods are summarised here.

119. Monthly digital aerial surveys were undertaken from July 2020 to September 2022, inclusive, by HiDef Aerial Surveying Limited (HiDef). The digital aerial survey transect lines were separated by 2 km and ran approximately north-west to south-east, crossing environmental gradients. Approximately 12.5% of the survey area was covered by the surveys.

120. The data collected during the 27 DAS were processed to generate an estimate of density and abundance within the OAA plus 4 km buffer. This area was used for site characterisation, following advice received from NatureScot in November 2018 that a 4 km buffer around a development area should be applied. (Note that current NatureScot guidance is to apply a 6 km buffer to commercial scale developments – see NatureScot Guidance Note 2.) The survey area was slightly adjusted in late January 2022 to accommodate a small change to the OAA (see **Appendix 1 - EIA and HRA: Baseline Site Characterisation Technical Report** for more details).

121. A summary of raw counts of seabirds recorded within the OAA plus 4 km buffer is presented in **Table 5-5**. This is the sum of counts from all 27 surveys. Guillemot was the most frequently

recorded species, followed by puffin and fulmar. Gannet and kittiwake were also recorded frequently. Other species recorded in non-trivial numbers (i.e. >10 individuals recorded across all 27 surveys) were great black-backed gull, razorbill, great skua, European storm-petrel, Arctic tern, herring gull and Manx shearwater.

Table 5-5. Raw counts of each species from with the OAA plus 4 km buffer.

Total raw counts are sum of raw counts from each of the 27 surveys. See ***Appendix 1 - EIA and HRA: Baseline Site Characterisation Technical Report*** *for a breakdown of raw counts by individual survey.*

Species	Total raw counts (indivs.)	Species	Total raw counts (indivs.)
Guillemot	9,027	Little auk	8
Puffin	5,818	Arctic skua	5
Fulmar	5,485	European Shag	4
Gannet	2,114	Great northern diver	3
Kittiwake	1,458	Red-throated diver	3
Great black-backed gull	210	Sooty shearwater	3
Razorbill	203	Common tern	2
Great skua	77	Black guillemot	2
European storm-petrel	53	Lesser black-backed gull	2
Arctic tern	44	Little gull	1
Herring gull	14	Common gull	1
Manx shearwater	12	Cory's shearwater	1
		Black-headed gull	1
		Great shearwater	1

122. Any species that had fewer than a total of 10 records within the OAA plus 4 km across all 27 surveys was considered to have a trivial abundance and these species were scoped out of the assessment (see **Appendix 2 - HRA: HRA Screening Technical Report**). This includes herring gull, where collision risk modelling was not undertaken due to the very low densities of this species recorded during baseline surveys. Had collision risk modelling been undertaken, estimated collisions would have been very small. This species is therefore not subject to detailed assessment.

123. Impacts on bird species recorded during the site-specific digital aerial surveys have been assessed here in relation to relevant breeding and non-breeding biological seasons, as advised in the NatureScot (2023) Guidance Note 9. A summary is presented in **Table 5-6**

124. NatureScot guidance defines some months as being split between the breeding and non-breeding seasons, e.g. for kittiwake, the first half of April is considered to be part of the non-breeding season and the second half of April is part of the breeding season.

125. For the non-breeding season, BDMPS seasons taken from Furness (2015) were used as advised in NatureScot Guidance Note 5[19] (**Table 5-6**)

[19] *Guidance Note 5: Guidance to support Offshore Wind Applications: Recommendations for marine bird population estimates | NatureScot*

Table 5-6. Seasonal definitions for all species taken forward for assessment, taken from NatureScot (2023, Guidance Note 9) and the BDMPS report (Furness, 2015).

Species	NatureScot (2023)		Furness (2015)		
	Breeding season	Non-breeding season	Spring migration	Autumn migration	Winter
Kittiwake	mid-April to August	September to mid-April	January to April	August to December	-
Great black-backed gull	April to August	September to March	September to March (single non-breeding BDMPS season)		
Arctic tern	May to August	September to April[2]	Late April to May	July to early September	-
Great skua	mid-April to mid-September	mid-September to mid-April	March to April	August to October	November to February
Guillemot	April to mid-August	mid-August to March	-	-	-
Razorbill	April to mid-August	mid-August to March	January to March	August to October	November to December
Puffin	April to mid-August	mid-August to March	-	-	-
European storm-petrel[1]	mid-May to October	November to mid-May	-	-	-
Fulmar	April to mid-September	mid-September to March	December to March	September to October	November
Gannet	mid-March to September	October to mid-March	December to March	September to November	-
Manx shearwater	April to mid-October	mid-Oct to March[2]	Late March to May	-August to early October	-

1: Species not included in Furness (2015).
2: Not present in significant numbers in Scottish marine areas.

126. Of the species present in non-trivial numbers, three were not observed in the offshore study area in the non-breeding season: European storm-petrel, Arctic tern and Manx shearwater. See **Appendix 1 - EIA and HRA: Baseline Site Characterisation Technical Report** for a breakdown of raw counts by individual survey and season.

127. For each species, design-based density and abundance estimates for each of the 27 surveys were calculated as follows:

- Density estimates for each species for each survey were calculated as the raw observation counts divided by the area surveyed;
- Abundance estimates were calculated as the density multiplied by the total area over which the abundance was to be estimated;
- Standard deviation and 95% confidence intervals were generated around density and abundance estimates using a non-parametric bootstrap approach;

- Density and abundance estimates were produced for birds in flight, sat on the sea and both in flight and on the sea combined.

128. To characterise the baseline for each species, density, abundance and distribution of birds (raw counts) on each survey, was produced for the OAA plus 4 km buffer.

129. Model-based estimates were also derived, following NatureScot Guidance Note 2[20]. Model-based estimates are NatureScot's preferred approach as this method uses statistical models and environmental covariates to generate bird distributions across the OAA, as well as produce density and abundance estimates that have been informed by a range of covariates. NatureScot requested that the Applicant use model-based approaches to estimating density, abundance and distributions to inform the impact assessment, where they can be calculated (NatureScot letter to the Project of 27 March 2024). Model-based estimates were generated and compared with design-based estimates in **Appendix 1 - EIA and HRA: Baseline Site Characterisation Technical Report**. Density surfaces generated using model-based methods are presented in **Annex 1O: MRSea model summaries and diagnostics**.

130. For many surveys, model-based methods were unable to produce a density surface, due to small sample sizes. Given this, NatureScot requested a comparison of design- and model-based density and abundance estimates (see **Appendix 1 - EIA and HRA: Baseline Site Characterisation Technical Report** which compares model and design-based estimates). Design based estimates were used to inform the assessment presented in this **Addendum to the RIAA**, as agreed with NatureScot (consultation meetings, 30 April 2024 and 7 May 2024).

5.4.2 Estimating collision mortality

131. Collision mortality was estimated using collision risk modelling, following NatureScot Guidance Note 7 – see **Appendix 3 - EIA and HRA: Collision Risk Modelling Technical Report** for full details. The Project Design for both the Most Likely Scenario (MLS) and Worst-Case Scenario (WCS) comprised 125 turbines. The difference between the two scenarios was turbine size, with MLS based on a WTG rotor diameter of 265 m and WCS on a WTG rotor diameter of 330 m.

132. Density estimates of birds in flight within the OAA (no buffer) were calculated for each of the 12 calendar months, using 24 months of digital aerial survey data from October 2020 to September 2022, inclusive, as advised by NatureScot (NatureScot letter dated 27 March 2024 and NatureScot consultation meeting, 28 May 2024). The 1,000 bootstrap estimates from each of the two surveys in a calendar month were appended and the mean and standard deviation of these 2,000 bootstrap estimates was taken (**Table 5-7).**

[20] *Guidance Note 2: Guidance to support Offshore Wind Applications: Advice for Marine Ornithology Baseline Characterisation Surveys and Reporting | NatureScot*

Table 5-7. Monthly mean density estimates and SDs, in parentheses, of birds in flight in the OAA, by calendar month. These are the mean and SD of bootstrap estimates from the two digital aerial surveys carried out in that calendar month.

	Mean and SD of density (birds/km²) of birds in flight within the OAA											
Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kittiwake	0.07 (0.03)	0.23 (0.16)	0.86 (0.29)	0.28 (0.16)	0.07 (0.05)	0.04 (0.02)	0.63 (0.68)	0.01 (0.01)	0.13 (0.13)	0.63 (0.18)	0.2 (0.09)	0.05 (0.02)
Great black-backed gull	0.04 (0.03)	0.04 (0.03)	0 (0.01)	0 (0)	0 (0)	0.01 (0.02)	0 (0)	0 (0)	0 (0)	0.01 (0.01)	0.06 (0.04)	0.09 (0.08)
Great skua	0 (0)	0 (0)	0 (0)	0.03 (0.03)	0 (0)	0 (0)	0.01 (0.01)	0.01 (0.01)	0 (0)	0 (0)	0 (0)	0 (0)
Gannet	0.01 (0.01)	0.07 (0.04)	0.13 (0.1)	0.3 (0.08)	0.24 (0.16)	0.21 (0.06)	0.3 (0.07)	0.32 (0.28)	0.49 (0.22)	0.58 (0.11)	0.01 (0.01)	0.03 (0.02)

133. The online Shiny app version of the stochastic collision risk modelling tool, sCRM (Caneco, 2022) was used to produce both stochastic and deterministic estimates of monthly collision mortality. Density inputs to the sCRM were derived by randomly selecting 1,000 samples from the combined 2,000 bootstrap estimates. Density inputs to the deterministic CRM were mean density per calendar month (**Table 5-7**).

134. Biometric parameters and avoidance rates followed NatureScot advice (email dated 4 June 2024). Only Option 2 with generic flight heights (Johnston et al. 2014) for the MLS and WCS were calculated, as advised by NatureScot (letter dated 27 March 2024). See **Table 5-8** for details of avoidance rates and biometrics used in collision risk modelling.

Table 5-8. Species biometrics, including Nocturnal Activity Factor (NAF) and avoidance rates (AR) used in stochastic and deterministic CRMs to generate collision estimates used in the assessment.

Species	Band (deterministic CRM) AR [a]	Stochastic CRM AR - mean (SD) [b]	Body length mean (metres) (SD) [c]	Wingspan mean (metres) (SD) [c]	Flight speed mean (m/s) (SD) [d]	NAF mean (SD) [e]	Flight type: Flapping or Gliding	% of flights upwind
Kittiwake	0.9924	0.9928 (0.0003)	0.39 (0.005)	1.08 (0.0625)	13.1 (0.4)	0.5 (0)	Flapping	50
Great black-backed gull	0.9936	0.9939 (0.0004)	0.71 (0.035)	1.58 (0.0375)	13.7 (1.2)	0.5 (0)	Flapping	50
Arctic tern	0.9902	0.9907 (0.0004)	0.34 (0.005)	0.8 (0.025)	10.9 (0.9)	0.125 (0)	Flapping	50
Great skua	0.9902	0.9907 (0.0004)	0.56 (0.0375)	1.36 (0.04)	14.9 (1.825)	0 (0)	Flapping	50
Gannet	0.9924	0.9928 (0.0003)	0.94 (0.0325)	1.72 (0.0375)	14.9 (0)	0.08 (0.1)	Gliding	50

a. Avoidance Rates for the Band model, i.e. deterministic CRM, are those presented in Appendix 1, Table 1 of NatureScot's letter dated 27 March 2024. The 'All gulls and terns rate' was used for Arctic tern.
b. Avoidance Rates for the stochastic CRM are those presented in Appendix 1, Table 2 of NatureScot's letter dated 27 March 2024. The 'All gulls and terns rate' was used for great skua and Arctic tern.
c. Body length and wind span biometrics were from Snow & Perrins, 1998.
d. All flight speeds from Alerstam *et al*., 2007, except for gannet and Arctic tern, which is from Pennycuick, 1997.
e. All nocturnal activity factors based on Garthe & Hüppop, 2004, except gannet which is from Furness *et al*., (2018)

135. No adjustment to gannet densities was applied to account for macro avoidance behaviour (see **Appendix 3 - EIA and HRA: Collision Risk Modelling Technical Report** for more details).

136. **Appendix 3 - EIA and HRA: Collision Risk Modelling Technical Report** provides estimates of monthly collision mortality (plus standard deviation for sCRM) generated by deterministic and stochastic collision risk models. Estimated collision mortality was summed across seasons, using the NatureScot and BDMPS seasonal definitions (**Table 5-6**).

137. Densities of herring gull within the OAA were too low to warrant collision risk modelling, with a peak density of only 0.02 birds/km^2 and with herring gulls recorded on only three of the 27 digital aerial surveys. Consequently, no collision risk modelling was undertaken for herring gull as estimated collision mortalities would be extremely low. Given this, a conclusion of no adverse effect on site integrity can be reached for all herring gull features of SPAs.

138. Generally, Manx shearwater and European storm-petrel fly too low to be at risk of collision with WTGs. Additionally, these two species were rarely recorded in the OAA in flight with just 14 and 53 individuals respectively, recorded across all 27 surveys (see **Table 5-5**). However, attraction to lighting on WTGs could increase collision risk for these species. No quantitative collision risk modelling was undertaken for these species but instead a qualitative assessment was carried out (see **Section 6.1.3** and **Section 6.2.4**). Therefore, collision risk modelling was undertaken for species considered sensitive to collisions, namely kittiwake, great black-backed gull, Arctic tern, great skua and gannet. However, no theoretical connectivity was established for any Arctic tern SPAs and the OAA so no LSE was concluded for this feature and impact pathway. Consequently, Arctic tern collision estimates are not presented here, in this **Addendum to the RIAA**. However, collision impacts on the wider regional population were assessed under the EIA Regulations and are presented in the **Addendum to the Offshore EIA Report.**

139. **Table 5-9** presents seasonal and annual estimated collisions for the four species for which CRM was undertaken, based on the stochastic CRM and WCS. Annual collision mortality was highest for kittiwake (56 birds per annum), with collisions occurring in all seasons. Gannet had the second highest collision mortality (45 birds per annum) with most collisions occurring during the breeding season. Great black-backed gull had fewer collisions (12 birds per annum), with almost all collisions occurring during the non-breeding season. Great skua had very few collisions, with only 0.38 collisions per annum. Very few great skua collisions were predicted for the non-breeding season.

Table 5-9. Summary of seasonal and annual mean estimated collisions for species for which CRM was undertaken. Collisions are from sCRM, Option 2 using a generic flight height, for the WCS. n/a = no BDMPS season for that species.

Season	Avoidance rate for sCRM	Breeding season (NatureScot)	Non-breeding season (NatureScot)	Non-breeding season (BDMPS)	Spring migration (BDMPS)	Autumn migration (BDMPS)	Winter season (BDMPS)	Annual
Kittiwake	0.9928 (0.0003)	17.86	38.18	n/a	21.87	16.31	n/a	**56.04**
Great black-backed gull	0.9939 (0.0004)	0.81	11.13	11.13	n/a	n/a	n/a	**11.94**
Great skua	0.9907 (0.0004)	0.25	0.13	n/a	0.13	0	0	**0.38**
Gannet	0.9928 (0.0003)	35.3	9.77	n/a	2.04	7.73	n/a	**45.06**

5.4.3 Assessing Project alone displacement mortality

140. Displacement mortality was estimated for all species with displacement and barrier effects identified as an impact pathway and which were recorded in the OAA plus 4 km buffer in non-trivial numbers, across the 27 surveys (**Table 5-5**). Thus, displacement mortality was assessed for kittiwake, Arctic tern, guillemot, razorbill, puffin, fulmar and gannet. However, as Arctic tern features of SPAs had no theoretical connectivity with the OAA plus 2 km buffer, LSE was ruled out for this impact pathway and no appropriate assessment was required for any Arctic tern features. Consequently, displacement mortality for this species is not presented here.

141. Displacement mortality was assessed using both SeabORD and the displacement matrix. Details of the SeabORD modelling are presented in **Appendix 4 - EIA and HRA: Displacement Technical Report, Annex 4A: SeabORD Analysis Final Report**. For both puffin and guillemot (the two species assessed using SeabORD, as advised by NatureScot by letter dated 31 May 2023) Sule Skerry & Sule Stack SPA showed the largest decreases in adult survival, for puffin and guillemot, of 0.495 and 0.302, respectively. However, displacement mortality estimated using the displacement matrix approach was used in the HRA assessment presented in this **Addendum to the RIAA.**

142. Inputs to the displacement matrix were derived from mean seasonal peaks (MSP) for each season. Abundance estimates for all birds (both in flight and sat on the water) in the OAA plus 2 km buffer were found for each of the 27 surveys. A 2 km buffer around the OAA was applied, as birds may be displaced from an area around the OWF, as well as from within the OAA.

143. Following NatureScot Guidance Note 8, MSP abundance estimates were calculated as the mean of peak abundance in a season, across two years of survey. Following NatureScot consultation advice (letter dated 3 June 2024), only complete seasons (i.e. when all months in that season had been surveyed) were used to calculate MSPs. This meant that surveys used to inform MSPs were selected from the full 27 months of survey data, rather than just 24 months, as was used for collision risk modelling. See **Table 5-6** for definitions of seasons.

144. **Table 5-10** presents the peak abundance (in the OAA plus 2km buffer) in each of the two years of survey, and the mean seasonal peak (MSP). Abundance estimates for each of the 27 surveys, from which peaks were selected, are presented in **Appendix 4 - EIA and HRA: Displacement Technical Report**.

Table 5-10. Summary of MSP abundance estimates (OAA plus 2km buffer, birds both in flight and on the sea) for seasons defined by NatureScot and BDMPS (Furness 2015). The peak abundance in a year and season is also provided.

Species and Season	Seasonal abundance peaks in the OAA plus 2km buffer (survey date month/year)		
	Year 1	Year 2	MSP
Kittiwake			
Breeding season (NatureScot)	496.4 (Apr-21)	1,729.1 (Jul-22)	1,112.7
Non-breeding season (NatureScot)	1,185.0 (Mar-21)	1,248.5 (Mar-22)	1,216.8
Spring migration (BDMPS)	1,185.0 (Mar-21)	1,248.5 (Mar-22)	1,216.8
Autumn migration (BDMPS)	1,000.3 (Oct-20)	597.1 (Oct-21)	798.7
Guillemot			
Breeding season (NatureScot)	6,887.4 (Apr-21)	9,057.7 (Jul-22)	7,972.5
Non-breeding season (NatureScot)	4,516.7 (Sep-20)	4,269.2 (Sep-21)	4392.9
Razorbill			
Breeding season (NatureScot)	139.6 (Apr-21)	142.8 (Jul-22)	141.2
Non-breeding season (NatureScot)	93.0 (Sep-20)	170.6 (Mar-22)	131.8
Spring migration (BDMPS)	92.9 (Feb-21)	170.6 (Mar-22)	131.8
Autumn migration (BDMPS)	93.0 (Sep-20)	131.6 (Aug-21)	112.3
Winter (BDMPS)	7.8 (Nov-20)	31.0 (Dec-21)	19.4
Puffin			
Breeding season (NatureScot)	4,930.0 (Jun-21)	5,613.7 (Jun-22)	5,271.9
Non-breeding season (NatureScot)	1,544.6 (Aug-20)	2,727.3 (Sep-21)	2,135.9
Fulmar			
Breeding season (NatureScot)	1,270.0 (Aug-21)	1,802.3 (Sep-22)	1,536.1
Non-breeding season (NatureScot)	3,463.9 (Dec-20)	2,264.4 (Mar-22)	2,864.1
Spring migration (BDMPS)	3,463.9 (Dec-20)	2,264.4 (Mar-22)	2,864.1
Autumn migration (BDMPS)	3,191.9 (Sep-20)	1,690.4 (Oct-21)	2,441.1
Winter (BDMPS)	1,085.7 (Nov-20)	541.8 (Nov-21)	813.8
Gannet			
Breeding season (NatureScot)	891.0 (Sep-21)	812.3 (Apr-22)	851.7
Non-breeding season (NatureScot)	884.0 (Oct-20)	1,457.8 (Oct-21)	1,170.9
Spring migration (BDMPS)	77.5 (Feb-21)	2,01.6 (Mar-22)	139.5
Autumn migration (BDMPS)	1,278.3 (Sep-20)	1,457.8 (Oct-21)	1,368.0

145. Displacement rates and mortality of displaced birds, which were used in the displacement matrix, are presented in **Table 5-11**. These rates are as advised by NatureScot, in Guidance Note 8, with the exception of fulmar. Displacement and mortality values for fulmar were advised by NatureScot and RSPB during pre-application advice. NatureScot advised use of a high and low mortality rate for displaced birds. Seasonal displacement mortalities, under the 'high' and 'low' impact scenarios, are presented in **Table 5-11**.

146. Guillemot had the highest displacement mortality, of 239 birds in the breeding season. Guillemot displacement mortality was lower in the non-breeding season. Puffin had the second highest displacement mortality, at 158 birds in the breeding season. Non-breeding season displacement mortality was low for this migratory species. By contrast, razorbill displacement mortality was low at just 4 birds in the breeding season.

147. Kittiwake displacement mortality reached a maximum of 11 birds during spring migration, with mortality fairly evenly spread across the year. Gannet had the highest displacement mortality in the autumn migration season (29 birds). Fulmar displacement mortality was higher in the non-breeding season (17 birds), but displacement mortality was relatively evenly spread across the year. Arctic tern had very low displacement mortality, at just 2 birds in the breeding season.

Table 5-11. Summary of predicted seasonal displacement mortality (mortalities per annum) from displacement within the OAA plus 2km buffer for LOW and HIGH displacement/mortality values for each species. Mortality estimated using the displacement matrix approach.

		LOW displacement impact scenario		HIGH displacement impact scenario	
Species	Season	Displacement / mortality rates used	Displacement mortality	Displacement / mortality rates used	Displacement mortality
Kittiwake	Breeding	30% / 1%	3.3	30% / 3%	10.0
	Non-breeding	30% / 1%	3.7	30% / 3%	11.0
	Spring Migration	30% / 1%	3.7	30% / 3%	11.0
	Autumn Migration	30% / 1%	2.4	30% / 3%	7.2
Guillemot	Breeding	60% / 3%	143.5	60% / 5%	239.2
	Non-breeding	60% / 1%	26.4	60% / 3%	79.1
Razorbill	Breeding	60% / 3%	2.5	60% / 5%	4.2
	Non-breeding	60% / 1%	0.8	60% / 3%	2.4
	Spring Migration	60% / 1%	0.8	60% / 3%	2.4
	Autumn Migration	60% / 1%	0.7	60% / 3%	2.0
	Winter	60% / 1%	0.1	60% / 3%	0.3
Puffin	Breeding	60% / 3%	94.9	60% / 5%	158.2
	Non-breeding	60% / 1%	12.8	60% / 3%	38.4
Fulmar	Breeding	20% / 1%	3.1	20% / 3%	9.2
	Non-breeding	20% / 1%	5.7	20% / 3%	17.2
	Spring Migration	20% / 1%	5.7	20% / 3%	17.2
	Autumn Migration	20% / 1%	4.9	20% / 3%	14.6
	Winter	20% / 1%	1.6	20% / 3%	4.9
Gannet	Breeding	70% / 1%	6.0	70% / 3%	17.9
	Non-breeding	70% / 1%	8.2	70% / 3%	24.6
	Spring Migration	70% / 1%	1.0	70% / 3%	2.9
	Autumn Migration	70% / 1%	9.6	70% / 3%	28.7

5.4.4 Collating in-combination impacts

148. Other OWFs will also impact some of the same SPAs as the Project. Therefore, an in-combination assessment is required to assess the consequences of the total in-combination mortality from both the Project and other OWFs, on the SPA populations. A list of OWFs for which an application has been submitted as of 31 December 2023 was collated. Advice was sought from MD-LOT on whether any other OWFs should be added to the list. MD-LOT advised that Seagreen Phase 1A and GreenVolt should be added (email dated 10 June 2024). In addition, Salamander was added to the list. See **Table 5-12** for the list of all OWFs included in the quantitative in-combination assessment.

Table 5-12. OWFs included in the quantitative in-combination assessment.

Offshore Wind Farm	Current project status
Berwick Bank	Application submitted
Blyth Demo	Operational
Beatrice Offshore Wind Farm	Operational
Dudgeon Extension Project and Sheringham Extension Project	Consented
Dogger Bank Creyke Beck A and B	Under Construction
Dogger Bank Teesside A and Sofia (formerly Dogger Bank Teesside B)	Under Construction/consented
Dudgeon	Operational
East Anglia One	Operational
East Anglia ONE North	Consented
East Anglia Three	Under Construction
East Anglia TWO	Consented
EOWDC	Operational
Forthwind	Consented
Galloper	Operational
Greater Gabbard	Operational
Greenvolt	Consented
Gunfleet Sands (I and II)	Operational
Hornsea Project Four	Consented
Hornsea Project One	Operational
Hornsea Project Three	Under Construction
Hornsea Project Two	Operational
Humber Gateway	Operational
Hywind	Operational
Inchcape	Under construction
Kentish Flats & Extension	Operational
Kincardine	Operational
Lincs, Lynn & Inner Dowsing	Operational
London Array	Operational
Methil	Operational
Moray East	Operational
Moray West	Under construction
Neart na Gaoithe	Under construction
Norfolk Boreas	Consented

Offshore Wind Farm	Current project status
Norfolk Vanguard	Consented
PFOWF	Consented
Race Bank	Operational
Rampion	Operational
Salamander	Application submitted
Seagreen Alpha & Bravo (including Phase 1A)	Operational (Phase 1A consented)
Sheringham Shoal	Operational
Teesside	Operational
Thanet	Operational
Triton Knoll	Operational
Westermost Rough	Operational

149. Information on seasonal collision mortality for each OWF was obtained from recent applications. Seasonal displacement mortality estimates were calculated from seasonal abundance estimates obtained from OWF applications, using the same displacement rates as used for the Project (**Table 5-11**) (note, Natural England do not require assessment of displacement impacts for kittiwake and so no displacement mortality was calculated for English projects.) See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for full details on how in-combination impacts were obtained.

150. MD-LOT advised (email dated 3 June 2024) that, as well as a quantitative assessment of all OWFs listed above, a qualitative in-combination assessment should also be undertaken for all OWFs for which a Scoping Opinion has been adopted. As of 19 June 2024, the following OWFs had a Scoping Opinion: Broadshore Hub including Scaraben and Sinclair, Buchan, Caledonia, Cenos, Culzean, Marramwind, Morven, Muir Mhor, Ossian, Spiorad na Mara and Stromar. Scoping Reports published on the Marine Directorate's website[21] were reviewed and information on seabird species recorded in higher abundance in each project's offshore development area was noted. Additionally, information in each Scoping Report on SPAs with breeding seabird qualifying features which could have connectivity with the offshore development area were extracted. Any SPAs and qualifying features which are included in the Project in-combination assessment that were also identified as having connectivity with any of the OWFs with an adopted Scoping Opinion were included in a qualitative in-combination assessment. Each of these OWFs were noted as potentially adding to the predicted in-combination impacts in the Appropriate Assessments for each relevant SPA and qualifying feature.

5.4.5 Apportioning collision and displacement mortality to SPAs

151. **Appendix 5 - HRA: Apportioning Technical Report** has all details of apportioning methods used and apportioning weightings for each SPA.

152. SPA citation population sizes for breeding seabird qualifying features are usually defined in terms of numbers of breeding adults. This is often presented as breeding pairs, e.g. Apparently Occupied Nests (AON). SPA population sizes from the recent seabird census,

[21] Marine Projects | marine.gov.scot

Seabirds Count (Burnell *et al.* 2023) were converted to numbers of individual breeding adults (see **Appendix 5 - HRA: Apportioning Technical Report** for details). Collision and displacement mortality occurring at an OWF will however impact all individuals using that sea area. This will include immature birds and birds taking a sabbatical (year off) from breeding. When apportioning impacts from an OWF to an SPA, it was necessary to account for immature and sabbatical birds. The proportion of immature birds in a population was taken from Furness (2015), which had derived the estimated ratio of adult : immature birds, in the BDMPS populations, from a stable age structure. The proportion of OWF mortalities (including the Project mortalities) assumed to be immature birds were removed from the predicted impacts. Additionally, a proportion of birds using an OWF area were assumed to be sabbatical birds, and these too were removed from the predicted impacts. The remaining breeding adult mortalities could then be apportioned to SPAs. See **Appendix 5 - HRA: Apportioning Technical Report** for more information on approaches to accounting for immature and sabbatical mortalities.

153. Collision and displacement impacts from the Project ('Project alone') and from other OWFs ('in-combination'), for each season (see Table 5-6 for season definitions) were apportioned to SPAs.

154. For the breeding season, the Project alone impacts were apportioned using the 'NatureScot method[22]'. This method calculates SPA weights as a function of distance, population size and the proportion of the area around the SPA within the SPA qualifying feature's foraging range which is sea. The weight for all SPAs was summed and the breeding season apportioning rate for each contributing SPA found, as its proportion of the sum. See **Table 4-1** for foraging ranges used.

155. SPA to OWF distance is normally calculated as the distance between the geometric centres of the SPA and OWF. Sule Skerry & Sule Stack SPA boundary overlaps with the OAA plus 2km boundary, and therefore NatureScot requested that the Project used the shortest distance from an SPA boundary to the OAA plus 2km buffer boundary (consultation meeting 21 May 2024). The straight-line distance from SPA boundary to OAA plus 2 km boundary was calculated for each SPA within foraging range of the OAA plus 2 km buffer. See **Appendix 5 - HRA: Apportioning Technical Report** for more details on methods and apportioning weightings for each SPA.

156. Due to the very close proximity of Sule Skerry & Sule Stack SPA to the OAA, for the breeding season, all breeding adults of qualifying features (guillemot, puffin and gannet) of the Sule Skerry and Sule Stack SPA, that were recorded in the OAA plus 2 km buffer, were assumed to be from this SPA. This also means that all Project alone breeding season impacts from these three species were apportioned almost entirely to this single SPA and not to any other SPAs.

157. In-combination breeding season impacts were apportioned using the same methods as for Project alone impacts, i.e. season-specific impacts from each OWF were apportioned to each SPA within foraging range of the OWF, using the NatureScot method. Straight line distance

[22] *https://www.nature.scot/doc/interim-guidance-apportioning-impacts-marine-renewable-developments-breeding-seabird-populations#A+theoretical+approach*

from SPA boundary to each OWF boundary was used. NatureScot's preferred method is to use by sea distances but confirmed that they were content with use of straight-line distances in this instance as it made very little difference to magnitude of impacts apportioned to each SPA (consultation meeting, 2 July 2024). See **Appendix 5 - HRA: Apportioning Technical Report** for more details on methods and apportioning weightings, as well as a comparison of apportioned mortalities using straight-line vs by sea distances.

158. Non-breeding season impacts were apportioned using the BDMPS (Furness, 2015) non-breeding season region to define which OWFs and SPAs to include in the in-combination assessment. The Project sits on the northern boundary of many species' east coast and west coast BDMPS regions. This means that birds impacted by the Project could be from SPAs along the west coast of the UK or the east coast (North Sea) of the UK. NatureScot advised (consultation meeting of 28 May 2024) that to simplify the impact assessment process, a worst-case scenario could be adopted of assuming that the Project mortalities were to breeding adults from SPAs along the North Sea coast of the UK and not to SPAs along the west coast of the UK. This assumption is more precautionary due to in-combination impacts to east coast SPAs being larger than on west coast SPAs, as there are currently many more OWFs in planning, consented or operational in the North Sea, than in the Irish Sea, the Celtic Sea and the west coast of Scotland. The UK North Sea BDMPS region and seasonal populations were used to apportion non-breeding season Project alone and In-combination impacts to SPAs.

159. The number of breeding adults that each SPA contributes to the UK North Sea BDMPS population in each season (e.g. spring migration, autumn migration, winter, etc.) was calculated and an SPA weighting derived (see **Appendix 5 - HRA: Apportioning Technical Report** for more details). As birds from SPAs are assumed to mix equally within a BDMPS region in the non-breeding season, the same SPA apportioning weighting was applied to all OWF impacts, including those from the Project, i.e. no distance weighting was required.

160. Guillemot do not migrate away from their SPAs in the non-breeding season but remain in the vicinity of the colony. Consequently, NatureScot advise using guillemot foraging range to identify which SPAs had theoretically connectivity with the Project in the non-breeding season, rather than the BDMPS approach. See **Appendix 5 - HRA: Apportioning Technical Report** for more details

5.4.6 Identifying SPA qualifying features requiring a PVA

161. Once Project alone and in-combination impacts from each season had been apportioned to all SPAs with connectivity to the West of Orkney Windfarm, impacts were summed to produce seasonal and annual mortality estimates for each SPA. Percentage point change in adult annual survival rate was then calculated by dividing annual Project alone or in-combination mortality, predicted for that SPA, by the SPA's breeding population size. Seasonal mortalities and change in adult survival rate are presented in the assessment for each individual SPA in **Section 6.3**.

162. Where impacts on SPA populations were sufficiently large, a PVA model was used to assess population response to predicted impacts. The threshold for determining whether a PVA

model was required followed NatureScot advice that was provided during a consultation meeting (21 May 2024). This was to use a two-step process:

1. Does the project alone or in-combination have a decrease in baseline adult annual survival that is equal to or greater than 0.02%?
   a. If no (i.e. < 0.02% decrease in adult survival) then a PVA is not required.
   b. If yes, then go to Step 2.
2. If decrease in adult survival is equal to or > 0.02%, then consider mortalities from the Project alone – are they > or equal to 0.2 birds per annum?
   a. If no (i.e. mortality is < 0.2 birds per annum), then a PVA is need for Project-alone impacts only, but not in-combination;
   b. If yes, then a Project alone and in-combination PVA is needed.

163. Where Project alone impacts were sufficiently small to not warrant further assessment by running a PVA, but in-combination impacts did exceed the PVA threshold, a PVA was run which produced population trajectories and metrics for both Project alone and in-combination impacts.

5.4.7 Assessing population response to predicted impacts

164. PVAs were run following advice in NatureScot Guidance Note 11[23]. The NE PVA on line tool was used to predict population size under a baseline scenario and under a scenario with Project alone and in-combination impacts, over a period of 25, 35 and 50 years. Starting population size was the population size found in the Seabirds Count census (Burnell *et al.* 2023).

165. Demographic rates provided in Horwsill and Robinson (2015) were used to parameterise the PVA, as advised by NatureScot. The demographic rates used for each PVA are provided in the input table, presented for each PVA run, in **Section 3** of **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** and are summarised in **Table 5-13**.

[23] *Guidance Note 11: Guidance to support Offshore Wind Applications: Marine Ornithology - Recommendations for Seabird Population Viability Analysis (PVA) | NatureScot*

Table 5-13 Demographic rates used in PVAs. No PVAs were run for fulmar or great skua and so demographic rates are not presented for these species

Species	Black-legged kittiwake	Northern gannet	Great black-backed gull	Common guillemot	Razorbill	Atlantic puffin
Age at first breeding	4	5	5	6	5	5
Productivity rate per pair - mean	0.586	0.679	0.930	0.501	0.440	0.415
Productivity rate per pair – SD	0.370	0.092	0.432	0.208	0.188	0.212
Adult survival rate – Mean	0.854	0.919	0.93	0.94	0.895	0.907
Adult survival rate - SD	0.051	0.042	0.1	0.025	0.067	0.083
Immatures survival rates 0 to 1 mean	0.790	0.424	0.93	0.560	0.63	0.709
Immatures survival rates 0 to 1 SD	0.077	0.045	0.1	0.058	0.067	0.108
Immatures survival rates 1 to 2 mean	0.854	0.829	0.93	0.792	0.63	0.709
Immatures survival rates 1 to 2 SD	0.077	0.026	0.1	0.152	0.067	0.108
Immatures survival rates 2 to 3 mean	0.854	0.891	0.93	0.917	0.895	0.709
Immatures survival rates 2 to 3 SD	0.077	0.019	0.1	0.098	0.067	0.108
Immatures survival rates 3 to 4 mean	0.854	0.895	0.93	0.938	0.895	0.76
Immatures survival rates 3 to 4 SD	0.077	0.019	0.1	0.107	0.067	0.093
Immatures survival rates 4 to 5 mean	-	0.919	0.93	0.94	0.895	0.805
Immatures survival rates 4 to 5 SD	-	0.042	0.1	0.025	0.067	0.083
Immatures survival rates 5 to 6 mean	-	-	-	0.94	-	-
Immatures survival rates 5 to 6 SD	-	-	-	0.025	-	-

166. Models included environmental and demographic stochasticity, with 1,000 simulations for each scenario. Models were density independent.

167. Following NatureScot Guidance Note 11 (see below), the two primary outputs from the PVA model which are used for interpreting population effects are the counterfactual of population growth rate (C-PGR) and the counterfactual of population size (C-PS).

NatureScot Guidance Note 11:

We advise the two ratio metrics that compare impacted and un-impacted populations should be applied in both EIA and HRA. The two metrics that should be used are generally termed 'Counterfactual (ratio) of final population size' (CPS) and 'Counterfactual (ratio) of population growth-rate' (CPG).

Ratio metrics provide the most robust measures of population level impacts. However, there is no standard threshold value with respect to what might be considered an "acceptable" level of impact. This will be specific to the population being considered and be informed by biological, statutory, policy and other considerations (such as population vulnerability to climate change). Ultimately, with respect to HRA, the level of impact must be compatible with the site specific Conservation Objectives to enable a conclusion of no adverse impact on site integrity.

In addition to the ratio metrics, other metrics, e.g. predicted final population size, can be supplied for context, and output graphs of PVA runs should be supplied where possible.

Counterfactual thresholds should not be applied. For example, a CPS of 95 or CPG of 90 or above might be considered to be a small enough effect size that the development would not lead to an adverse effect on site integrity. However, any counterfactual values that are used must be compatible with the Conservation Management Advice, as this provides the management requirements for each species and site reference populations which define what site integrity means for each SPA.

168. Although the two counterfactual measures may appear to be equally informative with respect to understanding the population consequences of impacts, which one is more appropriate depends on whether density dependent regulation has been included. Consideration of the properties of density dependent and density independent population projections illustrates why this is: a population regulated by density dependent feedback will maintain itself around an equilibrium level. Since there is no long-term growth or decline for such a population, when an impact is applied the population growth rate will only change in the short term, following which the population will once again settle at a new, lower, equilibrium size. Hence the change in growth rate (i.e. C-PGR) is of limited value for understanding the effect of an impact.

169. In contrast, the change in population size (C-PS) provides useful information on how much smaller the population will be in the presence of the impact. When a population is simulated without regulation (i.e. density independent), the population will grow or decline

exponentially. The baseline and impacted predictions will both change in this manner but the difference between the two will increase with duration as the baseline population grows more rapidly. Hence, the time point when the differences are considered is critical to the C-PS value obtained and how this is interpreted. However, the average growth rate of a density independent population is constant and therefore, a comparison of the baseline and impacted growth rates is insensitive to the duration over which the comparison is made. Thus, for density independent PVA, as presented here, the C-PGR is the more robust and reliable metric to use.

6 ASSESSMENT OF AEOSI FOR SPA AND RAMSAR SITES

6.1 Qualitative assessment of Impact Pathways occurring during construction and decommissioning

6.1.1 Impact Pathway 1: Disturbance and/or displacement impacts during construction and decommissioning

6.1.1.1 Impact Pathway 1a: Visual, noise or vibration disturbance/displacement due to construction and decommissioning of WTGs and other Project infrastructure within OAA

170. Disturbance and displacement of seabirds and wintering waterfowl could occur during construction and decommissioning. Seaduck, divers and grebes, as well as auks (i.e. guillemot, razorbill and puffin), are known to be susceptible to disturbance and displacement (Furness et al. 2013; Bradbury et al. 2014; SNCBSs *Joint Interim Displacement Advice Note* (2017, updated 2022[24]); see NatureScot Guidance Note 8: *Guidance to support Offshore Wind applications: Marine Ornithology Advice for assessing the distributional responses, displacement and barrier effects of Marine birds*[25]) and temporary displacement could occur during construction and decommissioning, both within the OAA and the ECC. NatureScot also advise that assessment of displacement impacts should be undertaken for kittiwakes and gannets and so these too could be displaced during construction. Gulls and skuas generally assumed to not be displaced (Furness et al. 2013; Bradbury et al. 2014; NatureScot Guidance Note 7).

171. All SPAs with qualifying features susceptible to displacement impacts and with theoretical connectivity with the OAA plus 2 km buffer during Project operation were also screened in for construction and decommissioning displacement and disturbance impacts. **Table 4-3** lists interest features screened in for disturbance/displacement impacts occurring during construction and decommissioning in the OAA and **Table 4-4** lists SPAs for which LSE could not be ruled out due to potential displacement and/or collision impacts.

172. Disturbance and displacement impacts could arise during Project construction and decommissioning due to the presence of vessels, both in transit and stationary while infrastructure is installed or removed, in a particular area. Visual and noise disturbance from installing WTG foundations and other construction operations could cause birds to be displaced from preferred foraging areas and/or could interrupt foraging behaviour and other key ecological behaviours. This, in turn, could reduce a bird's fitness and potentially have demographic consequences for survival and productivity.

173. Disturbance and displacement caused by construction or decommissioning of offshore Project infrastructure will be temporary and localised to the area of construction activity. Thus, a relatively small proportion of birds using the OAA will be exposed to this impact pathway at any one time, rather than all birds using the OAA being exposed. Additionally, construction and decommissioning will be of limited duration in any one part of the OAA, further limiting exposure of birds to this impact pathway.

[24] *Joint SNCB Interim Displacement Advice Note | JNCC Resource Hub*

[25] *https://www.nature.scot/doc/guidance-note-8-guidance-support-offshore-wind-applications-marine-ornithology-advice-assessing*

174. SPA Conservation Objectives are focussed on maintaining or restoring qualifying features in the long-term. As disturbance and displacement during construction and decommissioning operations in the OAA will not be long-term, but will be localised to relatively small areas for restricted periods of time, this impact pathway will not undermine conservation objectives of these sites. Consequently, no adverse effect on site integrity is concluded for SPA qualifying features using the OAA during construction and decommissioning, from disturbance and/or displacement. Note, all of these sites are also screened in for displacement and/or collision impacts arising during Project operation. This is assessed for each SPA individually, below.

175. Note that PVA projections were run with Project displacement impacts for a duration of 35 years, despite the operational period for the Project being 30 years. This is to accommodate any displacement effects that accrue during the construction and decommissioning phases of the Project. Prior to the Project becoming fully operational an increasing number of WTGs will be installed, which could cause disturbance and displacement impacts. Similarly, there will be a period after the Project ceases to be operational, before all WTGs are removed, which could also cause displacement. The consequences of these potential impacts on site integrity are fully assessed by modelling impacts in PVAs over a 35 year period.

6.1.1.2 *Impact Pathway 1b: Visual, noise or vibration disturbance/displacement on breeding seabirds and red-throated divers due to laying of export cables and other construction activities in the ECC*

176. Unlike the OAA, the ECC was not surveyed using an extensive digital aerial survey programme but part of the survey programme surveyed the northern part of the ECC. Additionally, the Pentland Floating Offshore Wind Farm (PFOWF) digital aerial surveys overlapped with part of the ECC. Information from both the Project's surveys and those of PFOWF showed similar species abundance and distribution to that found in the OAA (see **Figure 5-1**). Therefore, the same SPAs were screened in due to LSE from disturbance and displacement of qualifying features using the ECC during construction (see **Table 4-3**). Additionally, the Arctic tern feature of the Pentland Firth Islands SPA was also screened in for this impact pathway, as the short foraging range of this species established theoretical connectivity with the ECC but not the more distant OAA.

177. Within the offshore ECC, there is therefore potential for disturbance and displacement resulting from the presence of construction vessels installing the export cables. However, cable laying vessels are static for large periods of time and move only short distances as cable installation takes place, and offshore cable installation activity is a relatively low noise emitting operation. Additionally, the offshore ECC works are indicatively scheduled to only take place over a period of two months within each construction year (indicatively in May and June). Therefore, although it is possible that there could be temporary disruption of foraging to a small number of individuals, the overall risk of mortality to any seabirds resulting from disturbance is very small, and therefore there would be no potential to undermine any SPA's conservation objectives from construction activities occurring in the offshore ECC. Therefore, a conclusion of no adverse effect on site integrity from this impact pathway on these sites with breeding seabird features, is reached. Note, all of these sites, with the exception of Pentland Firth Islands SPA, are also screened in for displacement and/or

collision impacts arising during Project operation. This is assessed for each SPA individually, below.

178. In addition, the Caithness and Sutherland SPA was also screened in due to its breeding red-throated diver qualifying feature. The site boundary, at its closest point, is <9 km (the recommended red-throated diver foraging range, from NatureScot Guidance Note 3, see **Table 4-1**) from the ECC (**Figure 6-1**). LSE was established due to disturbance and displacement of this feature when foraging in the marine environment in proximity to the offshore Project.

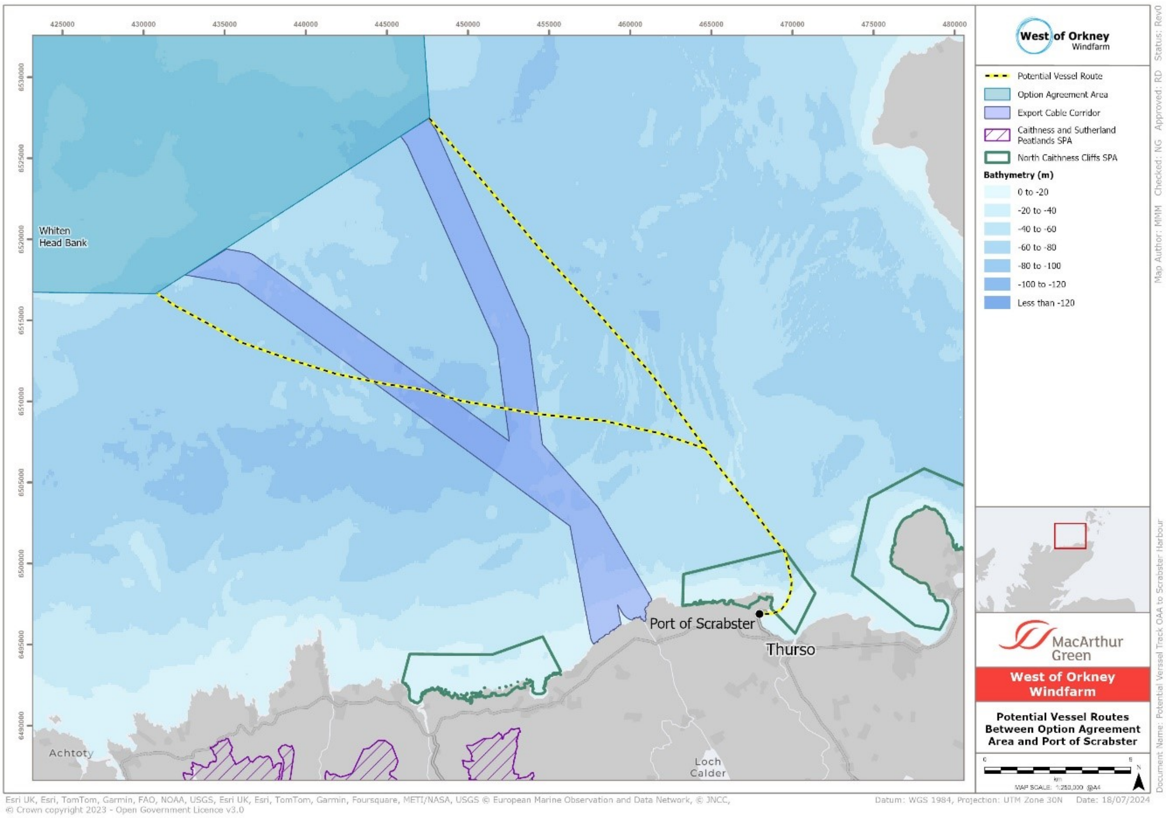


Figure 6-1. Map of the north coast of mainland Scotland, showing the ECC in relation to the Caithness and Sutherland Peatlands SPA (hashed purple polygons)

179. During the construction phase, vessels associated with operations to install export cables for the Project, including laying cables and horizonal drilling, could impact the red-throated diver qualifying feature of this site through disturbance/displacement.

180. Red-throated divers forage close inshore, favouring sheltered shallow sandy areas (Black *et al.*, 2015). Red-throated divers breeding in Orkney and Shetland, tagged with time depth recorders, mostly foraged in waters <8 m deep, with 94% of dives <15 m, although these could have been pelagic foraging rather than benthic foraging, i.e. birds may have been foraging in water deeper than their dive depth (see Figure 2E, in Duckworth et al. 2021). The marine area lying between the ECC and the Caithness and Sutherland Peatlands SPA has a rocky shoreline with no sheltered shallow bays. It is therefore unlikely that red-throated divers from the SPA would be foraging in any marine areas in the vicinity of the ECC. Furthermore, Black *et al.*

(2015) did not identify areas suitable for classification as SPAs for foraging red-throated divers in the breeding season from Caithness and Sutherland Peatlands SPA due this being '*deemed inappropriate because of the dispersed nature of both the nest sites within this SPA*' and also that, '*only two grid cells were classed as suitable around Caithness and Sutherland waters*'.

181. Given that red-throated divers from this SPA are unlikely to be using the marine areas within or close to the ECC, and that operations associated with installing an export cable will be temporary, lasting only a few months, the conservation objectives of the Caithness and Sutherland Peatlands SPA are unlikely to be undermined by operations associated with export cable installation. Therefore, a conclusion of no adverse effect on site integrity is reached for this impact pathway for this site. However, this site was also screened in for LSE due to collisions with WTG by migratory features of the site. This is assessed below.

6.1.1.3 Impact Pathway 1c: Visual or noise disturbance/displacement of wintering waterfowl and breeding red-throated divers in marine SPAs due to vessels passing close to or through marine SPAs when transiting to and from construction port

182. The following SPAs were screened in for potential impacts from vessel disturbance and displacement during construction of the Project (see **Table 5-2** for more details):

- Firth of Forth SPA
- Firth of Tay and Eden Estuary SPA
- Hoy SPA
- Inner Moray Firth SPA
- Moray Firth SPA
- North Caithness Cliffs SPA
- Orkney Mainland Moors SPA
- Outer Firth of Forth and St Andrews Bay Complex SPA
- Scapa Flow SPA
- Ythan Estuary, Sands of Forvie and Meikle Loch SPA.

183. The potential for disturbance/displacement from vessels associated with the Project to adversely affect a site's Conservation Objectives was assessed below, under the SPA-specific accounts, for sites where vessels associated with Project construction might transit *through* an SPA (Moray Firth SPA, Outer Firth of Forth and St Andrews Bay Complex SPA, Scapa Flow SPA), or sites which are functionally-linked to SPAs through which vessels might transit (Hoy SPA, Orkney Mainland Moors SPA). See **Figure 6-2** for indicative vessel transit routes and marine SPAs.

184. For SPAs which were screened in due to vessels potentially transiting within 15 km of their boundary, impacts were considered to be substantially lower and these are assessed here.

These sites were: Firth of Forth SPA; Firth of Tay and Eden Estuary SPA; Inner Moray Firth SPA; Ythan Estuary, Sands of Forvie and Meikle Loch SPA.

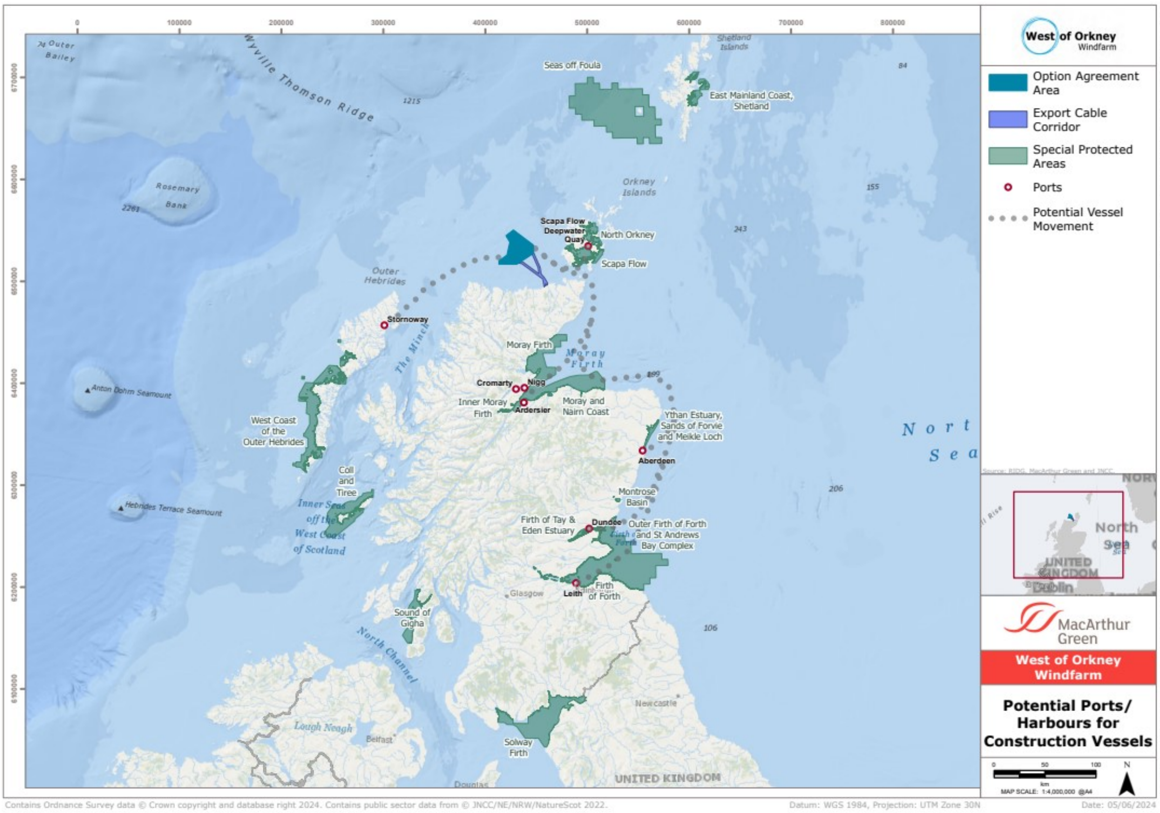


Figure 6-2. Map of Scotland showing the offshore Project area, marine SPAs, potential construction ports and indicative vessel routes that could be used by vessels associated with the Project.

185. The Project has not yet confirmed which ports will be used for storage, marshalling and assembly of the Project components, e.g. foundations, WTGs, etc. For this assessment, ports which could potentially be used for construction are: Scapa Deep Water Quay, Port of Nigg, Port of Cromarty, Ardersier, Port of Dundee and Port of Leith. The indicative vessel transit routes between the offshore Project area and ports that could be used for construction, shown in **Figure 6-2**, show that vessels will not transit through or very close to the Firth of Forth SPA, the Firth of Tay and Eden Estuary SPA, the Inner Moray Firth SPA or the Ythan Estuary, Sands of Forvie and Meikle Loch SPA.

186. Of the qualifying features of these sites, those which could potentially be disturbed or displaced by an increase in vessel traffic due to sensitivity to the presence of vessels (Bradbury et al. 2014; Goodship & Furness, 2022) are red-throated diver, common scoter, velvet scoter, goldeneye, scaup, long-tailed duck and eider. All the other features are of low sensitivity and show very little displacement in response to vessels (e.g. cormorant), or only occur very close inshore or on land, i.e. in a different part of the SPA to where construction vessels would be transiting.

187. The vessels transiting to and from ports used for construction will all be large vessels, as they will be transporting components of the Project, such as WTG blades, foundations, etc. (**Table 5-3** provides information on size and speed of vessels transiting between the offshore Project

area and construction ports.) Consequently, these vessels will be required to follow existing navigational routes used by vessels currently transiting to/from these ports. These existing routes are in relatively deep water and avoid shallow water, close to land, for navigational safety. Consequently, vessels will be avoiding areas that tend to be used by divers and seaduck. The sensitivity of divers, seaduck and grebe to the presence of vessels and other sources of disturbance is reviewed in **Section 5.2.1.3.7.** This shows that the qualifying diver and seaduck features of these four SPAs are unlikely to be disturbed by the presence of vessels further offshore. Furthermore, the review also notes that some species have demonstrated an ability to habituate to the presence of vessels or tend to avoid existing shipping lanes (see Schwemmer *et al.* 2011). Therefore, the presence of Project vessels would not add any additional disturbance or displacement impact to these qualifying features.

188. As an increase in vessel traffic in the vicinity of these four SPAs is unlikely to affect the sites' Conservation Objectives, a conclusion of no adverse effect on site integrity is reached for this impact pathway.

189. Note, all four of these sites were also screened in due to potential collision risk to their migratory bird qualifying features and named components of the site's waterfowl assemblage. The potential for this to affect the site's conservation objectives is considered below.

6.1.2 Impact Pathway 2: Direct and Indirect Impacts on Prey and Supporting Habitats during construction

190. Breeding seabird and breeding red-throated diver qualifying features of SPAs using the OAA and/or the ECC during construction could be impacted by changes in prey abundance or availability caused by construction operations. **Table 4-3** and **Table 4-4** shows which features and SPAs were screened in for this impact pathway.

191. Indirect impacts on prey species include those resulting from the production of underwater noise (e.g. during piling), temporary habitat loss and disturbance (e.g. during preparation of the seabed for foundations and cable installation) that may alter the behaviour or availability of bird prey species.

192. Underwater noise may cause fish and mobile invertebrates to avoid the construction area and also affect their physiology and behaviour. Temporary habitat loss and disturbance may cause fish and mobile invertebrates to avoid the construction area. These mechanisms may result in less prey being available within the construction area to foraging seabirds and red-throated divers. Such potential effects on benthic invertebrates and fish have been assessed in the **Offshore EIA Report, Chapter 10: Benthic subtidal and intertidal ecology** and **Chapter 11: Fish and shellfish ecology** and the conclusions of those assessments can inform this evaluation of indirect impacts on SPA qualifying features.

193. With regard to changes to the seabed and to suspended sediment levels, the **Offshore EIA Report Chapter 10: Benthic subtidal and intertidal ecology** discusses the nature of any change and impacts on the seabed and benthic habitats. The impact on benthic habitats is predicted to be of low or negligible magnitude with no significant impacts to any benthic receptors (this conclusion has not changed as a result of the **Benthic Subtidal and Intertidal Additional Information**). The consequent indirect impact for fish and shellfish ecology is

considered to be minor and not significant, and this is also likely to be the case for species such as herring, sprat and sandeel which are the main prey items of seabirds such as gannet and auks. As outlined in the **Offshore EIA Report Chapter 11: Fish and shellfish ecology**, sandeel and herring are potentially vulnerable to seabed disturbance as these species are demersal spawners with specific habitat requirements. However, considering the temporary, intermittent, and localised nature of this effect, it is considered to be a minor adverse impact (this conclusion has not changed as a result of the **Fish and Shellfish Additional Information**). The majority of the OAA is not suitable as spawning habitat for herring. However, a majority of benthic sediment samples were suitable habitats for sandeel spawning (see **Offshore EIA Report Chapter 11 Fish and shellfish ecology**, section 11.4.4.2.1), although only a small proportion of the offshore Project area is considered to represent prime sandeel habitat (see **Fish and Shellfish Additional Information**). The impact of increased suspended sediments during the construction stage on fish and shellfish ecology was scoped out of the EIA, as outlined in the **Offshore EIA Report Chapter 11: Fish and shellfish ecology**, and therefore, any effect on seabird and red-throated diver prey would be negligible. The **Fish and Shellfish Additional Information** considers increased suspended sediment impacts to common skate and sandeel (as requested by MDLOT and NatureScot) reaching a conclusion of minor consequence and no significant impact. Therefore, with a minor impact (or below) on fish that are marine bird prey species, it is concluded that indirect impacts on prey during the construction stage would not undermine any SPA's conservation objectives.

194. With regard to noise impacts on fish, the **Offshore EIA Report Chapter 11 Fish and shellfish ecology** discusses the potential impacts upon fish relevant to ornithology as prey species of the proposed Project. For species such as herring, sprat and sandeel, which are the main prey items of seabirds such as gannet, kittiwake and auks, underwater noise impacts (physical injury or behavioural changes) during construction are considered to be minor for herring and sprat (group 3, most sensitive species) and minor for sandeel (group 1, least sensitive species). The **Fish and Shellfish Additional Information** provides further consideration to underwater noise impacts to common skate eggs and sandeel eggs and larvae, with both assessments concluding minor impacts and no significant effect. With a minor impact on fish that are bird prey species, it is concluded that the indirect impacts on seabirds would not undermine any SPA's conservation objectives.

195. Overall, it can be reasonably concluded that there would be no adverse effect on site integrity for any SPA due to indirect changes to prey abundance or availability.

6.1.3 Impact Pathway 3: Negative impacts from artificial lighting on Project infrastructure and vessels

6.1.3.1 Scope of Assessment

196. NatureScot advised that the review of artificial lighting impacts on petrels and shearwaters by Deakin *et al.*, (2022) provides evidence that Manx shearwater, European storm-petrel and Leach's petrel behaviour may be affected by lighting associated with OWFs, and consequently, SPAs with these three species as qualifying features should be screened in for this impact pathway (NatureScot letter dated 27 March 2024).

NatureScot Advice (27 March 2024):

It is noted from the RIAA (Section 6.7.4) that Manx shearwater, European storm-petrel and Leach's storm-petrel have been screened out from negative impacts from artificial lighting based on Furness (2018). This should be re-considered in light of recent published work and a new project relating to petrels and shearwaters:

• Petrel and Shearwater Sensitivities to Offshore Wind farms – Evidence Review https://www.gov.scot/publications/review-inform-assessment-risk-collision-displacementpetrels-shearwaters-offshore-wind-developments-scotland/
• OWSMRF project KG4 - JNCC report 719 Towards better estimates of Manx shearwater and European storm-petrel population abundance and trends, demographic rates and at-sea distribution and behaviour
• ProcBe – Procellariiform Behaviours and Demographics https://jncc.gov.uk/aboutjncc/jncc-blog/archive/the-procbe-procellariiform-behaviour-and-demographics-project

197. Following NatureScot's advice, the other sources of information listed above were also consulted to review the extent to which attraction to or disorientation from artificial lighting could impact the integrity of sites.

198. JNCC is leading a project on Procellariiform Behaviour and Demographics (ProcBE), funded by OWEC. 2024 is the first summer of fieldwork for this project and so, at present, no results or project outputs are currently available (*pers. comm.* JNCC). However, in future, this project will provide valuable information on the behaviour of Manx shearwaters, European storm-petrels and Leach's petrels, including flight heights and foraging ranges, as well as population modelling.

199. OWSMRF, led by JNCC, undertook a review of current knowledge around Manx shearwater and European storm-petrel and how these species interact with offshore wind farms (Baker *et al*. 2022). The key knowledge gaps identified by OWSMRF were:

- Population size, breeding abundance and demographic rates (adult survival, juvenile survival, sabbatical rate), recognising the challenges of monitoring these burrow-nesting species; and
- Understanding of at-sea distribution and foraging range to better inform approaches to apportioning of impacts to colonies.

200. These JNCC sources of information are helpful with respect to obtaining a wider understanding of Procellariform behaviour at sea but do not provide new evidence on the extent to which artificial lighting might alter birds' behaviour and hence their risk of collision or changes to key behaviours such as foraging and resting.

201. Because no Leach's petrels were recorded during baseline surveys in the offshore Project area therefore no impact pathway for this qualifying feature.

202. There is evidence for puffin fledglings to be attracted to artificial lighting at close range (e.g. Atchoi *et al.,* 2020). Consequently, this impact pathway was screened in for puffin qualifying features. However, as this impact will only affect puffin fledglings on their first flight to the sea, only SPAs within sight of the offshore Project area were screened in. LSE was ruled out for this impact pathway for all SPAs with puffin features, other than Sule Skerry and Sule Stack SPA, which is close to the offshore Project area.

203. The following SPAs were therefore screened in for assessment of for negative impacts from artificial lighting associated with the Project during construction:

- For European storm-petrel: Auskerry, Flannan Isles, Mousa, North Rona and Sula Sgeir, Priest Island, Seas off St Kilda, Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro, St Kilda, Sule Skerry and Sule Stack, Treshnish Isles;
- For Manx shearwater: Copeland Islands, Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island, Irish Sea Front, Outer Firth of Forth and St Andrews Bay Complex, Rum, Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro, St Kilda;
- For puffin: Sule Skerry and Sule Stack SPA.

6.1.3.2 Assessment of Impact

204. During construction there may be a range of sources of offshore artificial lighting associated with the Project. Construction is planned to take place 24 hours in a day and so construction vessels present within the OAA and ECC during the hours of darkness will have navigational and safety lighting, allowing activities to continue at night (noting that the Project is at relatively high latitude and therefore there would be shorter hours of darkness during the months when offshore construction is most likely to take place). Additionally, safety lighting will be present on Project infrastructure once installed during the construction phase. Consequently, artificial lighting in the offshore Project area during construction will vary in intensity, frequency, location and extent within each season and each year. In general, the sources of lighting will be temporary and localised within the OAA or ECC, rather than across the whole offshore Project area.

205. The closest seabird colony to the OAA is Sule Skerry and Sule Stack SPA, which is designated for breeding seabirds, including amongst other species, European storm-petrel and puffin. Sule Skerry has an unmanned lighthouse, and according to Archer & Taylor (2009), it is in the centre of the puffin colony and many fledglings are attracted to the base of the lighthouse, both by the light and by the noise of the lighthouse generator when it is running. As this SPA is close to the Project, there is potential for birds, particularly newly fledged young, to be impacted by artificial construction lighting associated with the Project.

206. Lighting of construction sites, vessels and other structures at night may potentially be a source of attraction (phototaxis), or displacement for birds (see Furness 2018, Deakin *et al.*, 2022 for reviews of impact pathways). Phototaxis can be a serious hazard for burrow-nesting seabird species, particularly families belonging to the Procellariiformes including shearwaters and storm-petrels (Rodríguez *et al.,* 2014).

207. Adults of shearwater and storm-petrel species are nocturnally active at their breeding colonies and their chicks fledge from the burrows at night; strong phototaxis helps nestlings navigate away from their dark burrows towards the sea, as light intensity is naturally higher over the sea than onshore (Furness, 2018).

208. Fledglings of European storm-petrel, Leach's storm-petrel, Manx shearwater and puffin are likely to be most attracted to lighting when they first fledge from their burrows (Furness, 2018; Deakin *et al.* 2022). The young of Manx shearwaters and storm-petrels appear sensitive to light-induced attraction/disorientation on fledging flights from the colony (Atchoi *et al.,* 2020). Puffin, also a burrow nesting species whose chicks fledge at night, can show similar responses to light as petrels (Furness, 2018; and as witnessed by Archer & Taylor (2009) around Sule Skerry lighthouse).

209. Shearwater, petrel, and puffin fledglings can be exposed to a higher collision risk with onshore structures due to attraction to onshore artificial lights (Montevecchi, 2006; Wilhelm *et al.,* 2013; Rodriguez *et al.,* 2012a, b; Rodriguez *et al.,* 2014; 2017; Gineste *et al.,* 2017). In Scotland, on the islands of Rum and St Kilda (Harris *et al*., 1978; Miles *et al.,* 2010), Manx shearwaters, European storm-petrels, Leach's storm-petrels and puffin fledglings have been found grounded at street lights and illuminated windows during the short period in late summer when chicks are departing from nesting burrows, possibly in part due to an under-developed visual acuity due to a lack of visual stimulation in the darkness of the nest chamber (Atchoi *et al.,* 2020).

210. Attraction towards bright artificial light can be strong at times of poor visibility, particularly affecting migrating birds during the autumn, but it is generally seen where birds are exposed to intense white lighting, such as from lighthouses. Furness (2018), Ronconi *et al.,* (2015) and Day *et al*., (2015) all report that poor weather, e.g. fog, rain, low cloud cover, can exacerbate nocturnal attraction of migrant bird to lights at oil and gas production platforms, with on occasions thousands of birds being killed in a night, especially where gas is being flared. However, there is limited evidence for attraction of shearwaters and storm-petrels to oil and gas platform in the UK (Bourne, 1979; Sage, 1979), likely due to low densities of these species in the northern North Sea where seabird interactions with oil platforms have been studied.

211. In relation to construction phase impacts, the Deakin *et al*. (2022) review included a section looking at the potential for interaction of Procellariiformes with wind farm service vessels. Anecdotally there is evidence that birds, including petrels, are found on ships' decks, particularly during foggy conditions, likely becoming disorientated by the ship's floodlights. This may particularly affect recently fledged young, who may still have under-developed visual capabilities. It was however unclear to what extent birds were attracted to the ship, or whether they were attracted by other cues such as a recognised food source. Evidence suggests that storm-petrels generally can be attracted to vessels, probably for food which can be brought to the surface by lighting, or for fishing discards. In the context of use of vessels for service operations for wind turbines, nocturnally active Procellariiformes (especially storm-petrels) are sensitive to attraction (by phototaxis, olfaction, or visual cues associated with food sources), and may subsequently become disorientated, either by lighting associated with the vessel, or navigation lights on nearby turbines.

212. Deakin *et al*. (2022) concluded that there is currently a lack of evidence on which to judge the existence and strength of light attraction in Manx shearwaters and storm-petrels. The authors however found that the number of individuals recovered in campaigns to rescue grounded fledglings are typically very low in relation to the local population size, suggesting that birds are not attracted over large distances, or if so, only a small proportion of individuals are affected, or recovered. An example is provided relating to the number of fledgling Manx Shearwaters recovered in the town of Mallaig, Scotland (Syposz *et al.* 2018), which broadly corresponds, given the size and distance of the colony that is the likely source of the majority of individuals (Rum, 27 km away), with the number predicted if birds disperse randomly in all directions and the small proportion that orientate towards Mallaig are then attracted from very short range. Two cases (Barau's Petrels on Reunion Island, Indian Ocean and Cory's Shearwaters on Tenerife) are referred to where a large numbers of fledglings, representing large proportions (up to 40%) of the local population, were encountered grounded in brightly illuminated urban areas. In both cases, however, nesting sites are mainly located in high altitude areas in the island interior, and fledglings fly over brightly lit coastal areas to reach the sea.

213. On St Kilda, considerable numbers of Leach's and European Storm-petrels breed within 2 km and in direct line of sight of the village illuminations, but the number of grounded fledglings is <1% of the size of the breeding populations (Miles *et al.,* 2010). This suggests that fledglings are not susceptible to attraction to these light sources from long range, albeit the level of illumination in the village was relatively low (32 outside lights and 11 buildings with indoor lighting; Miles *et al.,* 2010).

214. Evidence suggests that puffin fledglings are attracted to light when they first leave the burrow and take their first flight to the sea, but that attraction likely occurs only over short distances (hundreds of metres) in response to bright white light close to breeding colonies. Furness (2018) for example noted that there seems to be no records of puffin fledglings being attracted to streetlights of coastal villages in Fife despite their proximity to the large puffin colony on the Isle of May. Unlike the Procellariformes, once fledged, puffins do not appear to show any attraction to or avoidance of artificial lighting.

215. During offshore construction the areas within the OAA or ECC lit with artificial light would be very small and restricted to isolated locations which are active at a given time. The boundary of the OAA is 1.7 km from the Sule Skerry and Sule Stack SPA marine extension boundary at its closest point. However, when considering the Restricted Build Area (see **Introduction to the Additional Ornithology EIA Information**), WTGs will be built at least 7 km from the SPA boundary (the marine extension to the SPA and not the colony itself). At other times, activity may be at considerably larger distances (potentially up to 37 km), depending on the final windfarm layout.

216. There are no records of phototaxis of nocturnal migrating birds towards navigation lights and although young birds may show phototaxis over short distances during fledging, there seems to be little or no attraction of older birds to lights except when they are exposed to intense white lighting such as from lighthouses. As light from construction sites is likely to be one or two orders of magnitude less powerful than that from lighthouses (Furness, 2018), phototaxis of migrating birds towards areas of construction is also considered a low risk.

217. Thus, the construction sites associated with the offshore Project are considered likely to be far enough removed from breeding colonies on Sule Skerry and Sule Stack SPA, and in turn, any other more distant SPA, as to render the risk of negative impacts from artificial lighting to be very low.

218. Overall, the limited evidence found by Deakin *et al.* (2022) relating to the extent to which artificial lighting on vessels and OWF infrastructure may impact seabird species suggests that negative impacts are likely to be very small. Consequently, a conclusion of no AEoSI was reached for this impact pathway, and sites listed above.

6.2 Qualitative assessment of Impact Pathways occurring during Project operation

6.2.1 Impact Pathway 4: Collision Impacts for SPAs with migratory species features

219. SPAs with qualifying features which migrate (excluding seabirds which are assessed separately) could be at risk of collision with WTGs at operational OWFs, while migrating to/from breeding, staging and wintering grounds.

220. The UK hosts internationally important numbers of breeding seabirds and wintering waterfowl, as well as many other bird species. Almost all of these species are migratory, moving substantial distances between breeding and winter areas (Wernham *et al.,* 2002). Woodward *et al.,* (2023) also note that, 'significant numbers of raptors and passerines may pass through UK waters during migration'. If a sufficient number of individuals of these migratory species collide with OWF WTGs, sites supporting these features could be impacted.

221. **Table 2-11** in **Appendix 2 - HRA: HRA Screening Technical Report** provides a list of the 197 SPA and Ramsar sites with migratory qualifying features that were screened in for further assessment. These are also listed in **Table 4-5** above. A tool to assess collision impacts on migratory features (the mCRM) is not yet published. Consequently, NatureScot advised using the Woodward *et al.* (2023) report which provides information on parameters to be used in collision risk modelling for migratory features. The information in this report was reviewed, along with information in WWT & MacArthur Green (2014), and in the Berwick Bank Wind Farm RIAA.

222. Most migratory species (excluding seabirds) were not recorded on any of the 27 digital aerial surveys of the OAA plus 4 km buffer (see digital aerial survey report in **Annex 1A**). Only five of the migratory species screened in were recorded during the 27 surveys: greylag goose (11 birds), pink-footed goose (2 birds), golden plover (5 birds), whimbrel (2 birds) and curlew (1 bird). Consequently, the risk of collision to migratory species passing through or close to the OAA during operation is likely to be very low, given that these species are absent or very rare before the OWF is constructed (i.e. numbers are likely to be lower still assuming that birds exhibit some form of avoidance behaviour).

223. WWT and MacArthur Green (2014) concluded that, for the ten existing and planned offshore windfarms in Scotland at the time, "Overall, birds on migration through Scottish waters are not considered to be at risk of significant levels of additional mortality, due to collisions with Scottish offshore wind farms". However, since this report was published in 2014, there has been a large increase in the size and number of OWFs that have been constructed, consented or are in the planning process.

224. As advised by NatureScot (letter to the Project dated 27 March 2024), the recent Woodward *et al.* (2023) report was considered alongside the information in the WWT & MacArthur Green (2014) report, to try and determine collision risks to screened in migratory species. The report provides information on population sizes, migratory routes, timing of migration, flight heights, flight speeds and avoidance rates, with an assessment of confidence in each of these parameters. It is however difficult to interpret these parameters without the migratory CRM to assess the likelihood of collision due to the Project, by individuals on migration.

225. The Berwick Bank strategic assessment of collision impacts for migratory species, as presented in their RIAA[26], included more recently consented and constructed OWFs, thereby updating the WWT and MacArthur Green (2014) report. The Berwick Bank RIAA also concluded that collision risk for migratory birds was sufficiently low that this would not cause an AEoSI for any SPAs screened in for their migratory bird interest features, either due to Berwick Bank Wind Farm alone, or in-combination with other OWFs. The more recent Green Volt application RIAA[27] also concluded that collision risk to migratory species was so small that they found no potential LSE for SPAs with migratory qualifying features.

226. The absence or very low abundance of migratory species recorded on digital aerial surveys of the OAA plus 4 km buffer, as well as the low estimated collision mortality from strategic assessments reviewed above, means that the Project presents a very low risk of mortality to migratory species, either from the Project alone, or in-combination collision mortality. Therefore, a conclusion of no adverse effect on site integrity is reached for all SPAs and Ramsar sites screened in for migratory species features listed below:

227. Abberton Reservoir, Abernethy Forest , Achanalt Marshes, Aird and Borve, Benbecula, Alde-Ore Estuary, Antrim Hills, Arran Moors, Assynt Lochs, Avon Valley, Bae Caerfyrddin/ Carmarthen Bay, Beinn Dearg, Belfast Lough, Ben Alder, Ben Wyvis, Benfleet and Southend Marshes, Berwyn, Black Cart, Blackwater Estuary (Mid-Essex Coast Phase 4), Bluemull and Colgrave Sounds , Bowland Fells, Breydon Water, Bridgend Flats, Islay, Broadland, Burry Inlet, Caenlochan, Cairngorms, Caithness Lochs, Cameron Reservoir, Carlingford Lough, Castle Loch, Lochmaben, Chesil Beach and The Fleet, Chew Valley Lake, Chichester and Langstone Harbours, Coll, Coll (corncrake), Coll and Tiree, Colne Estuary (Mid-Essex Coast Phase 2), Creag Meagaidh, Cromarty Firth, Dengie (Mid-Essex Coast Phase 1), Din Moss - Hoselaw Loch, Dornoch Firth and Loch Fleet, Dorset Heathlands, Drumochter Hills, Dungeness, Romney Marsh and Rye Bay, Dyfi Estuary / Aber Dyfi, East Mainland Coast, Shetland, East Sanday Coast, Eilean na Muice Duibhe (Duich Moss), Elenydd – Mallaen , Eoligarry, Barra, Exe Estuary, Fala Flow, Falmouth Bay to St Austell Bay, Forest of Clunie, Foulness (Mid-Essex Coast Phase 5), Gibraltar Point, Gladhouse Reservoir, Glen App and Galloway Moors, Glen Tanar, Greater Wash, Greenlaw Moor, Gruinart Flats, Islay, Hamford Water, Holburn Lake and Moss, Hornsea Mere, Humber Estuary, Inner Clyde Estuary, Inverpolly, Loch Urigill and nearby Lochs, Killough Bay, Kilpheder and Smerclate, South Uist, Kintyre Goose Roosts, Knapdale Lochs, Laggan, Islay, Lairg and Strath Brora Lochs, Langholm - Newcastleton Hills, Larne Lough, Lee Valley, Lewis Peatlands, Lindisfarne, Liverpool Bay / Bae Lerpwl, Loch Ashie, Loch Eye, Loch Flemington, Loch Ken and River Dee Marshes, Loch

[26] marine.gov.scot/sites/default/files/221220_-_eor0766_berwick_bank_wind_farm_-_riaa_part_3_spa_assessment_-_signed.pdf

[27] Green Volt Offshore Wind Farm Offshore Habitats Regulations Assessment (marine.gov.scot)

Knockie and Nearby Lochs, Loch Leven, Loch Lomond, Loch Maree, Loch of Inch and Torrs Warren, Loch of Kinnordy, Loch of Lintrathen, Loch of Skene, Loch of Strathbeg, Loch Ruthven, Loch Shiel, Loch Spynie, Loch Vaa, Lochnagar, Lochs of Spiggie and Brow, Lough Foyle, Lough Neagh and Lough Beg, Lower Derwent Valley, Martin Mere, Medway Estuary and Marshes, Mersey Estuary, Mersey Narrows and North Wirral Foreshore, Migneint-Arenig-Dduallt, Minsmere-Walberswick, Mointeach Scadabhaigh, Monach Islands, Montrose Basin, Moray and Nairn Coast, Morecambe Bay and Duddon Estuary, Muir of Dinnet, Muirkirk and North Lowther Uplands, Nene Washes, Ness and Barvas, Lewis, New Forest, North Inverness Lochs, North Norfolk Coast, North Orkney, North Pennine Moors, North Sutherland Coastal Islands, North Uist Machair and Islands, North York Moors, Northern Cardigan Bay / Gogledd Bae Ceredigion, Northumbria Coast, Oronsay and South Colonsay, Otterswick and Graveland, Ouse Washes, Outer Ards, Outer Thames Estuary, Pagham Harbour, Papa Stour, Peak District Moors (South Pennine Moors Phase 1), Pettigoe Plateau, Poole Harbour, Portsmouth Harbour, Rannoch Lochs, Rathlin Island, Renfrewshire Heights, Ribble and Alt Estuaries, Rinns of Islay, River Spey - Insh Marshes, Rutland Water, Salisbury Plain, Severn Estuary, Slamannan Plateau, Sléibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast), Slieve Beagh - Mullaghfad - Lisnaskea, Solent and Southampton Water, Solway Firth, Somerset Levels and Moors, Sound of Gigha, South Pennine Moors Phase 2, South Tayside Goose Roosts, South Uist Machair and Lochs, South West London Waterbodies, Stodmarsh, Stour and Orwell Estuaries, Strangford Lough, Strath Carnaig and Strath Fleet Moors, Switha, Teesmouth and Cleveland Coast, Thames Estuary and Marshes, Thanet Coast and Sandwich Bay, The Dee Estuary, The Swale, The Wash, Tiree (corncrake), Traeth Lafan/ Lavan Sands, Conway Bay, Treshnish Isles, Upper Lough Erne, Upper Nene Valley Gravel Pits, West Coast of the Outer Hebrides, West Inverness-shire Lochs, Wester Ross Lochs, Westwater.

228. Note, some of these sites were also screened in due to LSE from other impact pathways on other qualifying features within the site. These are assessed separately elsewhere in **Section 6** of this **Addendum to the RIAA.**

6.2.2 Impact Pathway 5: Disturbance, displacement and/or barrier effects during Project operation

6.2.2.1 Impact Pathway 5a: Disturbance/displacement occurring in the OAA during operation

229. Potential disturbance/displacement impacts occurring in the OAA during Project operation were assessed quantitatively. See below under each SPA account for impact assessments for each SPA and the qualifying feature which was screened in for this impact pathway.

6.2.2.2 Impact Pathway 5b: Disturbance/displacement occurring in the ECC

230. This impact pathway was screened out as no disturbance/displacement impacts to qualifying features of SPAs are expected to occur within the ECC during Project operation.

6.2.2.3 Impact Pathway 5c: Visual or noise disturbance from vessels transiting between the OAA and the Operations & Maintenance base

231. The Project has not yet confirmed the location of the Operations and Maintenance base but for the purposes of this assessment, it is assumed to be in Scrabster. Vessels transiting between Scrabster Harbour and the OAA during Project operation will transit through the North Caithness Cliffs SPA marine extension.

232. North Caithness Cliffs SPA was also screened in for a quantitative assessment of displacement and collision impacts occurring during operation. Consequently, there is a detailed SPA account for the assessment of impacts on this site. Impacts arising from displacement/disturbance due to vessels transiting through the SPA are assessed in the North Caithness Cliffs SPA account below.

6.2.3 Impact Pathway 6: Direct and Indirect Impacts on Prey and Supporting Processes

233. Presence of WTGs and other infrastructure, particularly subsea infrastructure, has the potential to alter prey communities and availability, e.g. changes to fish communities following introduction of hard structures. This has the potential to affect all species that are potentially foraging in the OAA and ECC.

234. It was therefore not possible to rule out LSE for all seabird and red-throated diver qualifying features with theoretical connectivity with the OAA and ECC (see **Table 4-3**).

235. With regard to noise impacts on fish, as outlined in **Offshore EIA Chapter 11: Fish and shellfish ecology**, this impact was scoped out for all receptors with the exception of diadromous fish in relation to barrier effects. For key prey species such as herring, sprat and sandeel, underwater noise impacts during the operation and maintenance stage are expected to be negligible, and therefore, **Offshore EIA Chapter 11: Fish and shellfish ecology** concludes that the effects on fish and shellfish species to operational noise are considered to be not significant. With a non-significant effect on fish that are bird prey species, it can be concluded that the indirect impacts on birds occurring in or around the OAA and the offshore ECC during the operation and maintenance stage would not undermine any SPA's conservation objectives.

236. With regard to changes to the seabed and to suspended sediment levels, **Offshore EIA Chapter 8: Marine physical and coastal processes** and **Offshore EIA Chapter 10: Benthic subtidal and intertidal ecology** discuss the nature of any change and impact. They conclude that changes in physical processes, temporary habitat loss/disturbance, long term habitat loss or damage would be not significant. While the Benthic Subtidal and Intertidal Additional Information considers impacts to the seabed further, in line with the MD-LOT and NatureScot request, none of the conclusions of the Offshore EIA have changed. For fish and shellfish, habitat loss and disturbance could result in a reduction of spawning, nursery or feeding habitats for key prey species. This effect may be long-term in areas of habitat loss (e.g. cable protection) but highly localised, as described in **Offshore EIA Chapter 11: Fish and shellfish ecology**. Therefore, the impact was considered to be minor adverse and not significant. As per the construction stage, increased suspended sediments were scoped out of the assessment of effects on fish and shellfish ecology. The Fish and Shellfish Additional Information considers increased suspended sediments impacts to common skate and sandeel (as requested by MD-LOT and NatureScot) reaching a conclusion of minor consequence and no significant impact. With a non-significant unmitigated effect on both benthic habitats and species and fish and shellfish ecology, it could be concluded that the indirect impacts on birds occurring in or around the OAA and the offshore ECC during the operation and maintenance stage would not undermine any SPA's conservation objectives.

237. With regard to EMF effects, these are identified as localised with cables being buried to a target depth of 1-3 m depth, further reducing the effect of EMF. The significance of effect was considered minor adverse on benthic communities and negligible or minor adverse for fish and shellfish ecology (the **Benthic Subtidal and Intertidal Additional Information** and **Fish and Shellfish Additional Information** has not changed this conclusion), and so it could be concluded that the indirect impact on seabirds occurring in or around the OAA and the offshore export cable during the operation and maintenance stage would not undermine any SPA's conservation objectives.

238. Very little is known about potential long-term changes in invertebrate and fish communities due to colonisation of hard substrate, the potential of new structures to cause fish aggregation and changes in commercial fishing pressures associated with offshore windfarms. The impact of the colonisation of introduced hard substrate is seen as low magnitude in terms of benthic ecology (as it is a change from the baseline conditions). The impact of potential fish or predator aggregation is considered to be negligible. The consequences for seabirds may be positive or negative locally but would not undermine any SPA's conservation objectives.

239. Currently, there are several research projects underway to improve understanding of the changes that occur across trophic levels when OWF are constructed in an area. New findings from these projects will provide an improved understanding of how changes to prey availability and abundance affects seabird populations. For example:

- PrePARED: Predators and Prey Around Renewable Energy Developments is investigating changes to fish communities and consequent changes to marine mammal and seabird distributions and behaviour, following the construction and operation of OWFs in the Moray Firth and the Forth and Tay regions PrePARED – An offshore renewables science project (owecprepared.org)
- PELAgIO: Physics-to-Ecosystem Level Assessment of Impacts of Offshore Windfarms is exploring the impacts of offshore wind development across all levels of the food chain, from plankton to top predators PELAgIO - ECOWind.

240. Based on current understanding, the potential for changes to prey abundance and availability to undermine any SPA's conservation objectives is very low and consequently no adverse effect on site integrity Is concluded for all sites assessed for this impact pathway.

6.2.4 Impact Pathway 7: Negative impacts from navigational lighting on turbines and vessels

6.2.4.1 *Scope of Assessment*

241. The potential impacts of artificial lighting on seabird species was previously reviewed in detail in **Section 6.1.3.** In summary, there is evidence for Manx shearwaters, European storm petrels and puffins being attracted to artificial lighting (Deakin *et al.* 2022; Furness, 2018). Based on the assumption that artificial lighting during the operation and maintenance period may again impact upon these species, the same SPAs where they are features were screened in for assessment:

- For European storm-petrel: Auskerry, Mousa, North Rona and Sula Sgeir, Priest Island, Seas off St Kilda, Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro, St Kilda, Sule Skerry and Sule Stack, Treshnish Isles;
- For Manx shearwater: Copeland Islands, Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island, Irish Sea Front, Outer Firth of Forth and St Andrews Bay Complex, Rum, Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro, St Kilda;
- For puffin: Sule Skerry and Sule Stack SPA.

6.2.4.2 *Assessment of Impact*

242. During Project operation, artificial lighting within the offshore Project area will primarily consist of navigational lighting on WTGs and OSPs. Most routine vessel activity in the offshore Project area will take place during daylight hours. Some operations may involve vessels staying in or near the offshore Project area during darkness, but this will only be for restricted periods of time.

243. Embedded mitigation for the Project includes a commitment that excess lighting, above levels set by regulatory requirements for navigation, aviation, escape/emergency procedures and general activity, will be avoided wherever possible (see **Section 3.2**).

244. Deakin *et al.* (2022) reviewed the risks associated with artificial lighting at offshore wind farms. It was identified that artificial lighting could cause phototaxis, i.e. attraction to lighting, leading to an increased risk of collision with WTG blades, or cause disorientation birds to spend longer in flight around lights instead of foraging, leading to a decrease in body condition and potentially reduced survival and productivity. A further consequence may be displacement from foraging areas. The authors therefore do not consider artificial lighting to be a separate impact pathway, but instead may exacerbate one or more of the recognised impact pathways (e.g. collision or displacement).

245. The authors also note the importance of making a distinction between attraction and disorientation, and the spatial scales at which they operate. The first will affect the number of birds brought into the vicinity of the wind farm ("macro" and "meso" scales, Cook *et al*., 2018), and the second will affect the length of time birds remain within the proximity of potential collision sources, particularly WTGs ("micro" scale, Cook *et al.,* 2018). These two impacts may have different drivers, and impact juveniles and adults differently.

246. Deakin *et al.* (2022) presented evidence for light-induced disorientation, including grounding of Manx shearwaters and storm-petrels, although the distance over which the initial attraction takes place is generally unknown. The authors state that numbers of grounded birds recovered are typically very low in relation to the local population size, suggesting that birds are not attracted over large distances, or if so, only a small proportion of individuals are affected, albeit recovery rates, for storm-petrels in particular, may be low due to their smaller size and greater ability to take off again than Manx shearwaters.

247. In relation to collision risks, the authors refer to a number of studies which describe procellariform seabirds being drawn downwards towards bright lights shining from below, e.g. when flying over a town. However, evidence is lacking on the extent to which Manx

shearwaters, storm-petrels and puffins, generally considered to be of very low risk of collisions (mainly flying close to the sea below WTG rotor-swept area) would be drawn upwards to rotor height, particularly to the higher altitudes at the top of the nacelle, where the lighting would be.

248. Attraction towards bright artificial lights can be strong at times of poor visibility, but it is generally seen where birds are exposed to intense white lighting, such as from lighthouses, rather than the lower intensity lighting associated with WTGs. Syposz *et al*. (2021) reported that Manx shearwaters avoided bright white light and blue/green light, rather than red light and that there was no difference in the birds' behaviour when exposed to red light compared to no light.

249. Furness (2018), Ronconi *et al.* (2015) and Day *et al*. (2015) all reported that poor weather (e.g. fog, rain, low cloud cover) exacerbated nocturnal attraction of migrant birds to lights at oil and gas production platforms, with on occasions thousands of birds being killed in a night, especially where gas is being flared. However, there is limited evidence for attraction of shearwaters and storm-petrels to oil and gas platform in the UK (Bourne, 1979; Sage, 1979), likely due to low densities of these species in the northern North Sea where seabird interactions with oil platforms have been studied.

250. Long-range attraction to lighting may result in birds being displaced from foraging areas and activities, but the extent of such attraction is difficult to quantify. Although Manx shearwaters and storm-petrels cover large distances when foraging, they may still target particular oceanographic features, and therefore displacement from these may affect foraging or rafting behaviours.

251. Most storm-petrel breeding colonies in northwest Europe are located close to the continental shelf edge and in Britain and Ireland colonies are located on the northern and western coasts, mostly within 150 km of the shelf edge. Bolton (2021) suggests that storm-petrels are therefore reliant on the biologically productive waters of the shelf edge for feeding, and this has been supported by boat-based survey results (Kober et al., 2012, Waggitt et al., 2020).

252. Bolton (2021) reported on a study that tracked of storm-petrels breeding within the largest UK colony on Mousa, Shetland. It was found that storm-petrels regularly ranged up to 300 km from the colony and showed highly consistent use of continental shelf waters to the south of the colony. Storm-petrels avoided coastal waters during daylight (potentially to avoid avian predators), but high usage of the area close to colony was recorded during the hours of darkness.

253. Although most identified impacts are adverse, Deakin *et al.* (2022) also note that there is a possibility that birds could benefit from increased foraging opportunities due to artificial lighting around wind farm developments, particularly if there are increases in prey availability by attracting it close to the sea surface. Evidence is provided that, as an example, storm-petrels have been observed foraging around illuminated fish farms at night in the Faroe Islands.

254. The closest seabird colony to the OAA is Sule Skerry and Sule Stack SPA (1.7 km from the offshore Project area), which is designated for breeding seabirds, including amongst other species, European storm-petrel and puffin. Manx shearwaters and European storm petrels avoid coming close to land during daylight hours, primarily to avoid risk of predation by gulls and other avian predators (e.g. Bolton, 2021). Individuals return to colonies at night, when predation risk is much lower. Consequently, European storm petrels are likely to be returning to the Sule Skerry and Sule Stack SPA at night, when they could be at risk of attraction to or disorientation from lighting in the OAA, e.g. on WTGs, whereas the risks to breeding Manx shearwaters are likely to be lower, as they return to more distant colonies.

255. Sule Skerry has an unmanned lighthouse, and according to Archer & Taylor (2009), it is in the centre of the puffin colony and fledglings are attracted to the base of the lighthouse, both by the light and by the noise of the lighthouse generator when it is running. As this SPA is close to the Project, there is potential for birds, particularly newly fledged young, to be attracted to, and possibly impacted by, navigational lighting associated with the Project.

256. Overall, however, based on the evidence provided, the impacts of artificial lighting due to the operation and maintenance of the Project is considered to be low, due to the following reasons:

- The lower intensity and high altitude of WTG lighting compared to other recognised sources of attraction such as oil platforms or lighthouses;
- The red lighting on WTGs is less likely to negatively impact Manx shearwaters, compared to white or blue/green lighting;
- The long distances between the OAA and most SPAs with Manx shearwater, European storm petrel and puffin qualifying features, with the exception of Sule Skerry and Sule Stack SPA;
- The lack of apparent high suitability foraging habitat within the OAA for shearwaters and petrels, based on known species' preferences and survey data;
- Due to the Restricted Build Areas, the distance of any WTG from the nearest colonies being at least 7 km from the SPA boundary (the marine extension to the SPA and not the colony itself), reducing the likelihood of attraction by significant numbers of young birds on fledging flights;
- The likely low proportion of the overall SPA populations that would be affected; and
- The low susceptibility of Manx shearwater, European storm-petrel and puffin to collisions with WTGs due to flight behaviour, even allowing for possible attraction to structures.

257. This conclusion is consistent with the literature review by Furness (2018) which found that the available evidence suggests that obstruction lights on offshore wind turbines in European shelf seas are extremely unlikely to have any detectable effect on birds as a consequence of any of the processes listed above. Furness (2018) considered the type and intensity of lighting installed at offshore wind farms, compared with the evidence of attraction to other coastal and offshore lit structures and concluded that, "*the evidence*

indicates that obstruction or navigation lights on turbines will have no significant effects on marine birds or on migrant terrestrial birds passing nearby".

258. Consequently, a conclusion of no adverse effect on site integrity from negative impacts from artificial lighting during operation is reached for the following sites:

Auskerry, Mousa, North Rona and Sula Sgeir, Priest Island, Seas off St Kilda, Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro, St Kilda, Sule Skerry and Sule Stack, Treshnish Isles, Copeland Islands, Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island, Irish Sea Front, Outer Firth of Forth and St Andrews Bay Complex and Rum.

6.3 Quantitative assessment of collision and displacement impacts

259. A quantitative approach was taken to assessing collision and displacement impacts potentially arising due to the operation of WTGs in the OAA. Methods used are described in detail in **Section 5.4.** The qualifying features and list of SPAs screened in for these impact pathways is summarised in **Table 4-3** and **Table 4-4.** Detailed information on each SPAs qualifying features, distance from OAA and whether the site was screened in for breeding season or non-breeding season theoretical connectivity is provided in **Table 2-4** and **Table 2-5** in **Appendix 2 – HRA: HRA Screening Technical Report.**

260. Results of this assessment are presented below. Where predicted impacts on a site were relatively small, a PVA was not run and a conclusion of no adverse effect on site integrity was reached. Where impacts were larger, a PVA was run and an SPA-specific account is provided.

261. In addition to assessment of operational collision and displacement impacts in the OAA, displacement impacts from vessels during construction and operation were also assessed under SPA-specific accounts for: Hoy SPA, Moray Firth SPA, North Caithness Cliffs SPA, Orkney Mainland Moors SPA, Outer Firth of Forth and St Andrews Bay Complex SPA and Scapa Flow SPA. Information on assessment methods and initial assessment results for other SPAs screened in under this impact pathway can be found in **Section 6.1.1** and **Section 6.2.2.**

6.3.1 Assessment of SPAs with breeding seabird features with low predicted impacts

262. Four marine SPAs were also screened in due to them having breeding seabird qualifying features, as described below:

- The **Irish Sea Front SPA** was screened in for its Manx shearwater qualifying feature. The very large foraging range of Manx shearwater means that the Project is within foraging range from the Irish Sea Front SPA, despite the site being 559 km from the Project. However, Manx shearwaters were rarely recorded in the OAA plus 4 km buffer across the 27 digital aerial surveys of the area, with only 12 birds recorded, in total. Also, these few birds are more likely to be from SPAs with Manx shearwater qualifying features which are closer to the OAA, e.g. Rum at 212 km and St Kilda at 268 km Given this and the distance of the site from the Project, a conclusion of no AEoSI is reached for this SPA.
- The **Seas off Foula SPA** was screened in due to connectivity with the OAA with the site's guillemot, puffin, great skua and fulmar qualifying features. As the site is 130 km from

the OAA, no features using the marine environment within or close to the SPA will be impacted by the Project. However, the site has a functionally linked breeding seabird colony SPA, Foula SPA, which was screened in for the same features and, in addition, razorbill and kittiwake. If the Project impacts the Foula SPA, there is a risk that the functionally-linked Seas off Foula SPA is also indirectly impacted. This was evaluated by assessing impacts at the colony SPA Impacts on the Foula SPA have been assessed in detail below. A conclusion of no AEoSI was reached for the Foula SPA and so consequently, no AEoSI was also concluded for the Seas off Foula SPA.

- The **Seas off St Kilda SPA** was screened in due to connectivity with the OAA with the site's puffin, European storm petrel, gannet and fulmar qualifying features. As the site is 197 km from the OAA, no features using the marine environment within or close to the SPA will be impacted by the Project. However, similar to the Seas off Foula SPA, the Seas off St Kilda SPA has a functionally linked breeding seabird colony SPA, St Kilda SPA. This colony SPA was also screened in for connectivity with its puffin, kittiwake, European storm petrel, gannet, great skua, fulmar and Manx shearwater qualifying features. A conclusion of no AEoSI was reached for the St Kilda SPA. Consequently, no AEoSI was also concluded for the Seas off St Kilda SPA.
- **Northumberland Marine SPA** is an English marine SPA which was screened in for connectivity with the OAA during the non-breeding season for its puffin and kittiwake qualifying features. During the breeding season, this site is functionally linked to seabird breeding colonies: Farne Islands SPA, Coquet Island SPA, Lindisfarne SPA and Northumbria Coast SPA. Farne Islands SPA and Coquet Island SPA were also screened in for non-breeding season connectivity with their razorbill, kittiwake and puffin qualifying features. A conclusion of no AEoSI was reached for these two colony SPAs and so consequently, no AEoSI is also concluded for Northumberland Marine SPA.

263. Project-alone and in-combination mortality and change in adult annual survival rate was used to determine whether further assessment was required for each breeding seabird qualifying feature of sites which were screened in (see **Table 4-4** for list of sites and **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details). Following NatureScot advice provided during a consultation meeting on 21 May 2024, a PVA was run for a qualifying feature and site following a two-step process:

1. Does the project alone or in-combination have a decrease in baseline adult annual survival that is equal to or greater than 0.02%?
   - If no (i.e. < 0.02% decrease in adult survival) then a PVA is not required.
   - If yes, then go to Step 2.
2. If decrease in adult survival is equal to or > 0.02%, then consider mortalities from the Project alone – are they > or equal to 0.2 birds per annum?
   - If no (i.e. mortality is < 0.2 birds per annum), then a PVA is need for Project-alone impacts only, but not in-combination;
   - If yes, then a Project alone and in-combination PVA is needed.

264. A total of 49 qualifying features at 25 SPAs had sufficiently large Project alone and/or in-combination impacts to warrant a PVA being run.

265. The tables below provide all the Project alone and in-combination annual mortalities and changes to adult survival rates apportioned to SPAs with potential connectivity to the Project for kittiwake, gannet, great black-backed gull, guillemot, razorbill, puffin, fulmar and great skua. The SPA-species combinations with sufficiently large Project alone and/or in-combination impacts, which met the threshold for requiring a PVA to be run, are highlighted in the tables below. Full details of the inputs and results of the PVA are provided in **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** and a summary of the key PVA results, for the Project alone and in-combination impacts, are discussed in the SPA accounts for each SPA in this report.

Table 6-1. Kittiwake Project alone and in-combination (including 'inc' or excluding 'exc' Berwick Bank impacts) summed collision and low displacement mortality (30% displacement x 1% mortality) and resultant percentage point change in annual adult survival rate. 'X' indicates when a PVA was required (see text for details on thresholds). Cells are highlighted when change in survival rate ≥0.02% or Project-alone annual mortality ≥ 0.2. Highlighted SPA names indicate a PVA was run for that SPA population

SPA	Project alone		In-combination (inc. Berwick Bank)		In-combination (exc. Berwick Bank)		PVA required for:		
	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Project alone	In-combination (inc. Berwick Bank)	In-combination (exc. Berwick Bank)
Ailsa Craig	0.00	0.0001	0.25	0.0256	0.06	0.0066			
Buchan Ness to Collieston Coast SPA	1.08	0.0048	78.32	0.3467	54.59	0.2416		X	X
Calf of Eday SPA	0.08	0.0121	2.48	0.3686	2.09	0.3108			
Canna and Sanday SPA	0.01	0.0005	0.37	0.0130	0.13	0.0045			
Cape Wrath SPA	2.47	0.0340	3.52	0.0485	3.43	0.0473	X	X	X
Copinsay SPA	0.13	0.0070	2.71	0.1421	2.21	0.1158			
East Caithness Cliffs SPA	5.16	0.0105	222.63	0.4547	194.96	0.3982		X	X
Fair Isle SPA	0.07	0.0074	2.53	0.2823	2.13	0.2375			
Farne Islands	0.26	0.0030	50.94	0.5786	16.97	0.1927		X	X
Flamborough and Filey Coast	2.86	0.0031	419.02	0.4604	381.98	0.4197		X	X
Flannan Isles SPA	0.01	0.0007	0.09	0.0057	0.08	0.0050			
Forth Islands	0.26	0.0029	49.06	0.5401	23.84	0.2624		X	X
Foula SPA	0.03	0.0036	1.07	0.1263	0.90	0.1063			
Fowlsheugh SPA	0.83	0.0029	138.28	0.4925	71.59	0.2550		X	X
Handa SPA	0.50	0.0067	1.61	0.0215	1.05	0.0140		X	X
Hermaness, Saxa Vord and Valla Field SPA	0.03	0.0086	1.26	0.3547	1.05	0.2972			
Hoy SPA	0.23	0.0423	1.61	0.3029	1.36	0.2558	X	X	X
Marwick Head SPA	0.35	0.0193	2.16	0.1192	1.89	0.1041		X	X
Mingulay and Berneray SPA	0.01	0.0003	0.15	0.0035	0.13	0.0030			

SPA	Project alone		In-combination (inc. Berwick Bank)		In-combination (exc. Berwick Bank)		PVA required for:		
	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Project alone	In-combination (inc. Berwick Bank)	In-combination (exc. Berwick Bank)
North Caithness Cliffs SPA	4.11	0.0369	44.37	0.3982	37.97	0.3408	X	X	X
North Colonsay and Western Cliffs	0.01	0.0001	1.27	0.0190	0.45	0.0068			
North Rona and Sula Sgeir SPA	0.04	0.0031	0.13	0.0094	0.12	0.0087			
Noss SPA	0.04	0.0111	1.63	0.4561	1.37	0.3824			
Rousay SPA	0.19	0.0285	5.76	0.8731	4.84	0.7341	X		
Rum SPA	0.01	0.0006	0.23	0.0161	0.09	0.0061			
Shiant Isles SPA	0.02	0.0011	0.12	0.0058	0.12	0.0056			
St Abbs Head to Fast Castle	0.26	0.0025	68.05	0.6607	16.91	0.1642		X	X
St Kilda SPA	0.00	0.0004	0.05	0.0064	0.05	0.0054			
Sumburgh Head SPA	0.03	0.0014	0.74	0.0385	0.64	0.0329			
Troup, Pennan and Lions Head	1.27	0.0060	60.99	0.2873	47.20	0.2223		X	X
West Westray SPA	1.26	0.0228	39.40	0.7150	33.13	0.6012	X	X	X

Table 6-2. Kittiwake Project alone and in-combination (including 'inc' or excluding 'exc' Berwick Bank impacts) summed collision and high displacement mortality (30% displacement x 3% mortality) and resultant percentage point change in annual adult survival rate. 'X' indicates when a PVA was required (see text for details on thresholds). Cells are highlighted when change in survival rate ≥0.02% or Project-alone annual mortality ≥ 0.2. Highlighted SPA names indicate a PVA was run for that SPA population

SPA	Project alone		In-combination (inc. Berwick Bank)		In-combination (exc. Berwick Bank)		PVA required for:		
	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Project alone	In-combination (inc. Berwick Bank)	In-combination (exc. Berwick Bank)
Ailsa Craig	0.00	0.0001	0.32	0.0324	0.08	0.0081			
Buchan Ness to Collieston Coast SPA	1.38	0.0061	98.77	0.4372	67.05	0.2968		X	X
Calf of Eday SPA	0.11	0.0156	2.82	0.4196	2.24	0.3334			
Canna and Sanday SPA	0.02	0.0007	0.48	0.0168	0.16	0.0058			
Cape Wrath SPA	3.29	0.0455	4.61	0.0637	4.48	0.0618	X	X	X
Copinsay SPA	0.18	0.0092	3.18	0.1663	2.46	0.1288			
East Caithness Cliffs SPA	6.70	0.0137	269.40	0.5503	229.55	0.4689		X	X
Fair Isle SPA	0.09	0.0095	2.87	0.3205	2.27	0.2538			
Farne Islands	0.33	0.0038	62.02	0.7045	18.21	0.2068		X	X
Flamborough and Filey Coast	3.63	0.0040	440.45	0.4840	388.94	0.4274		X	X
Flannan Isles SPA	0.01	0.0009	0.11	0.0067	0.09	0.0057			
Forth Islands	0.33	0.0037	65.14	0.7171	32.56	0.3584		X	X
Foula SPA	0.04	0.0046	1.22	0.1436	0.97	0.1137			
Fowlsheugh SPA	1.06	0.0038	173.98	0.6196	87.68	0.3123		X	X
Handa SPA	0.67	0.0090	2.13	0.0283	1.41	0.0188		X	X
Hermaness, Saxa Vord and Valla Field SPA	0.04	0.0110	1.42	0.4016	1.12	0.3159			
Hoy SPA	0.30	0.0562	1.89	0.3558	1.53	0.2873	X	X	X
Marwick Head SPA	0.46	0.0256	2.54	0.1403	2.13	0.1178	X	X	X
Mingulay and Berneray SPA	0.02	0.0005	0.17	0.0041	0.14	0.0034			

SPA	Project alone		In-combination (inc. Berwick Bank)		In-combination (exc. Berwick Bank)		PVA required for:		
	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Project alone	In-combination (inc. Berwick Bank)	In-combination (exc. Berwick Bank)
North Caithness Cliffs SPA	5.45	0.0489	53.04	0.4760	43.73	0.3925	X	X	X
North Colonsay and Western Cliffs	0.01	0.0001	1.60	0.0240	0.55	0.0082			
North Rona and Sula Sgeir SPA	0.06	0.0042	0.16	0.0116	0.15	0.0104			
Noss SPA	0.05	0.0142	1.85	0.5167	1.46	0.4068			
Rousay SPA	0.24	0.0367	6.55	0.9918	5.18	0.7844	X	X	X
Rum SPA	0.01	0.0008	0.29	0.0205	0.11	0.0077			
Shiant Isles SPA	0.03	0.0014	0.17	0.0077	0.16	0.0074			
St Abbs Head to Fast Castle	0.33	0.0032	85.63	0.8313	19.87	0.1929		X	X
St Kilda SPA	0.00	0.0006	0.06	0.0073	0.05	0.0058			
Sumburgh Head SPA	0.03	0.0018	0.85	0.0439	0.69	0.0355			
Troup, Pennan and Lions Head	1.63	0.0077	70.88	0.3338	51.61	0.2431		X	X
West Westray SPA	1.62	0.0294	44.71	0.8115	35.36	0.6417	X	X	X

Table 6-3. Gannet Project alone and in-combination (including 'inc' or excluding 'exc' Berwick Bank impacts) summed collision and low displacement mortality (70% displacement x 1% mortality) and resultant percentage point change in annual adult survival rate. 'X' indicates when a PVA was required (see text for details on thresholds). Cells are highlighted when change in survival rate ≥0.02% or Project-alone annual mortality ≥ 0.2. Highlighted SPA names indicate a PVA was run for that SPA population

SPA	Project alone		In-combination (inc. Berwick Bank)		In-combination (exc. Berwick Bank)		PVA required for:		
	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Project alone	In-combination (inc. Berwick Bank)	In-combination (exc. Berwick Bank)
Ailsa Craig	0.00	0.0000	31.59	0.0475	29.11	0.0438			
Fair Isle	0.3	0.003	22.75	0.2288	22.33	0.2246		X	X
Flamborough and Filey Coast	1.02	0.0038	206.87	0.7724	204.77	0.7645		X	X
Forth Islands	5.13	0.0034	711.18	0.4725	626.95	0.4165		X	X
Hermaness, Saxa Vord and Valla Field	1.88	0.0032	122.02	0.2064	119.8	0.2026		X	X
North Rona and Sula Sgeir	0.07	0.0003	9.52	0.0388	9.25	0.0377			
Noss	0.75	0.0027	51.23	0.1861	50.27	0.1826		X	X
St Kilda	0.46	0.0004	34.71	0.0288	33.49	0.0278		X	X
Sule Skerry and Sule Stack	20.46	0.1128	32.8	0.1809	32.55	0.1796	X	X	X

Table 6-4. Gannet Project alone and in-combination (including 'inc' or excluding 'exc' Berwick Bank impacts) summed collision and high displacement mortality (70% displacement x 3% mortality) and resultant percentage point change in annual adult survival rate. 'X' indicates when a PVA was required (see text for details on thresholds). Cells are highlighted when change in survival rate ≥0.02% or Project-alone annual mortality ≥ 0.2. Highlighted SPA names indicate a PVA was run for that SPA population

SPA	Project alone		In-combination (inc. Berwick Bank)		In-combination (exc. Berwick Bank)		PVA required for:		
	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Project alone	In-combination (inc. Berwick Bank)	In-combination (exc. Berwick Bank)
Ailsa Craig	0.00	0.0000	42.67	0.0642	40.19	0.0605			
Fair Isle	0.61	0.0061	30.55	0.3073	30.14	0.3031		X	X
Flamborough and Filey Coast	2.07	0.0077	272.16	1.0161	270.07	1.0083		X	X
Forth Islands	10.4	0.0069	945.77	0.6283	861.54	0.5724		X	X
Hermaness, Saxa Vord and Valla Field	3.78	0.0064	165.52	0.28	163.3	0.2762		X	X
North Rona and Sula Sgeir	0.15	0.0006	12.76	0.052	12.48	0.0509			
Noss	1.52	0.0055	69.3	0.2517	68.34	0.2482		X	X
St Kilda	0.96	0.0008	47.53	0.0394	46.3	0.0384		X	X
Sule Skerry and Sule Stack	26.4	0.1456	42.39	0.2338	42.14	0.2325	X	X	X

Table 6-5. Great black-backed gull Project alone and in-combination summed collision mortality and resultant percentage point change in annual adult survival rate. 'X' indicates when a PVA was required (see text for details on thresholds). Cells are highlighted when change in survival rate ≥0.02% or Project-alone annual mortality ≥ 0.2. Highlighted SPA names indicate a PVA was run for that SPA population.[1]

	Project alone		In-combination		PVA required for:	
SPA	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Project alone	In-combination
Calf of Eday SPA	0.08	0.0700	5.05	4.3500	X	
Copinsay SPA	0.07	0.0600	4.35	3.2400	X	
East Caithness Cliffs SPA	0.15	0.0300	15.11	2.8400	X	
Hoy SPA	0.10	0.1600	1.46	2.2800	X	

1. Great black-backed gull were screened out of the Berwick Bank HRA assessment due to be being present in the Proposed Development array area in low numbers

Table 6-6. Guillemot Project alone and in-combination low displacement mortality (60% displacement and 3% mortality for the breeding season / 1% mortality for the non-breeding season) and resultant percentage point change in annual adult survival rate. 'X' indicates when a PVA was required (see text for details on thresholds). Cells are highlighted when change in survival rate ≥0.02% or Project-alone annual mortality ≥ 0.2. Highlighted SPA names indicate a PVA was run for that SPA population[1]

	Project alone		In-combination		PVA required for:	
SPA	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Project alone	In-combination
Calf of Eday	0.13	0.0028	2.04	0.0435		
Cape Wrath	1.46	0.0029	18.3	0.0358		X
Copinsay	0.71	0.0028	29.44	0.1189		X
East Caithness Cliffs	5.70	0.0028	662.77	0.3314		X
Fair Isle	0.70	0.0028	2.64	0.0108		
Handa	2.09	0.0029	26.16	0.0357		X
Hoy	0.35	0.0029	6.59	0.0532		X
Marwick Head	0.46	0.0029	7.11	0.0443		X
North Caithness Cliffs	1.49	0.0029	92.49	0.1774		X
North Rona and Sula Sgeir	0.29	0.0028	0.34	0.0033		
Rousay	0.23	0.0029	3.49	0.0441		X
The Shiant Isles	0.35	0.0028	0.35	0.0028		
Sule Skerry and Sule Stack	76.39	0.6334	81	0.6717	X	X
West Westray	1.10	0.0028	15.32	0.0398		X

1. Berwick Bank Wind Farm was beyond foraging range for guillemot and so impacts from this OWF, along with other OWFs beyond foraging range, were not included in this in-combination assessment.

Table 6-7. Guillemot Project alone and in-combination high displacement mortality (60% displacement and 5% mortality for the breeding season / 3% mortality for the non-breeding season) and resultant percentage point change in annual adult survival rate. 'X' indicates when a PVA was required (see text for details on thresholds). Cells are highlighted when change in survival rate ≥0.02% or Project-alone annual mortality ≥ 0.2. Highlighted SPA names indicate a PVA was run for that SPA population.[1]

	Project alone		In-combination		PVA required for:	
SPA	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Project alone	In-combination
Calf of Eday	0.40	0.0085	5.82	0.1243		X
Cape Wrath	4.37	0.0086	54.73	0.1072		X
Copinsay	2.12	0.0085	80.81	0.3264		X
East Caithness Cliffs	17.09	0.0085	1427.37	0.7138		X
Fair Isle	2.09	0.0085	7.38	0.0301		X
Handa	6.26	0.0085	78.34	0.1069		X
Hoy	1.06	0.0086	17.39	0.1404		X
Marwick Head	1.37	0.0086	20.17	0.1256		X
North Caithness Cliffs	4.46	0.0086	237.96	0.4565		X
North Rona and Sula Sgeir	0.88	0.0085	1.02	0.0099		
Rousay	0.68	0.0085	9.93	0.1253		X
The Shiant Isles	1.04	0.0085	1.04	0.0085		
Sule Skerry and Sule Stack	127.78	1.0595	140.72	1.1669	X	X
West Westray	3.29	0.0085	45.45	0.1182		X

1. Berwick Bank Wind Farm was beyond foraging range for guillemot and so impacts from this OWF, along with other OWFs beyond foraging range, were not included in this in-combination assessment.

Table 6-8. Razorbill Project alone and in-combination (including 'inc' or excluding 'exc' Berwick Bank impacts) low displacement mortality (60% displacement and 3% mortality for the breeding season / 1% mortality for the non-breeding season) and resultant percentage point change in annual adult survival rate. 'X' indicates when a PVA was required (see text for details on thresholds). Cells are highlighted when change in survival rate ≥0.02% or Project-alone annual mortality ≥ 0.2. Highlighted SPA names indicate a PVA was run for that SPA population.

SPA	Project alone		In-combination (inc. Berwick Bank)		In-combination (exc. Berwick Bank)		PVA required for:		
	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Project alone	In-combination (inc. Berwick Bank)	In-combination (exc. Berwick Bank)
Cape Wrath SPA	0.38	0.0087	0.91	0.0209	0.88	0.0202		X	X
East Caithness Cliffs SPA	0.59	0.0000	82.37	0.204	77.95	0.1931		X	X
Fair Isle SPA	0.01	0.0004	2.12	0.0821	1.81	0.0702			
Flamborough and Filey Coast	0.07	0.0002	63.3	0.1689	59.77	0.1595			
Flannan Isles SPA	0.00	0.0000	0.2	0.0128	0.18	0.0119			
Forth Islands	0.02	0.0002	41.66	0.5459	28.77	0.377			
Foula SPA	0.00	0.0005	0.85	0.1334	0.72	0.1136			
Fowlsheugh SPA	0.02	0.0001	99.71	0.5291	82.44	0.4375			
Handa SPA	0.21	0.0019	1.36	0.0124	1.29	0.0117			
Mingulay and Berneray SPA	0.00	0.0000	1.89	0.0071	1.75	0.0065			
North Caithness Cliffs SPA	0.36	0.0075	6.41	0.1337	5.84	0.1217		X	X
North Rona and Sula Sgeir SPA	0.00	0.0007	0.21	0.0391	0.19	0.0363			
Shiant Isles SPA	0.00	0.0000	0.8	0.0074	0.74	0.0068			
St Abbs Head to Fast Castle	0.01	0.0002	14.81	0.3771	6.38	0.1624			
St Kilda SPA	0.00	0.0000	0.32	0.029	0.29	0.0268			
Troup, Pennan and Lions Head	0.01	0.0002	11.89	0.1964	11.28	0.1863			
West Westray SPA	0.04	0.0013	1.36	0.0471	1.18	0.0407			

Table 6-9. Razorbill Project alone and in-combination (including 'inc' or excluding 'exc' Berwick Bank impacts) high displacement mortality (60% displacement and 5% mortality for the breeding season / 3% mortality for the non-breeding season) and resultant percentage point change in annual adult survival rate. 'X' indicates when a PVA was required (see text for details on thresholds). Cells are highlighted when change in survival rate ≥0.02% or Project-alone annual mortality ≥ 0.2. Highlighted SPA names indicate a PVA was run for that SPA population.

SPA	Project alone		In-combination (inc. Berwick Bank)		In-combination (exc. Berwick Bank)		PVA required for:		
	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Project alone	In-combination (inc. Berwick Bank)	In-combination (exc. Berwick Bank)
Cape Wrath SPA	0.50	0.0116	1.94	0.0447	1.85	0.0426		X	X
East Caithness Cliffs SPA	0.84	0.0000	175.82	0.4355	162.54	0.4026		X	X
Fair Isle SPA	0.02	0.0007	6.32	0.245	5.39	0.2091			
Flamborough and Filey Coast	0.14	0.0004	137.33	0.3664	126.71	0.3381			
Flannan Isles SPA	0.00	0.0000	0.61	0.0396	0.56	0.0366			
Forth Islands	0.04	0.0005	77.81	1.0196	55.2	0.7233			
Foula SPA	0.01	0.001	2.56	0.4031	2.18	0.3433			
Fowlsheugh SPA	0.05	0.0003	177.79	0.9435	147.49	0.7827			
Handa SPA	0.28	0.0025	3.56	0.0324	3.34	0.0304		X	X
Mingulay and Berneray SPA	0.00	0.0000	5.83	0.0218	5.4	0.0201			
North Caithness Cliffs SPA	0.48	0.0101	16.01	0.3338	14.29	0.2979		X	X
North Rona and Sula Sgeir SPA	0.01	0.001	0.63	0.1193	0.59	0.1105			
Shiant Isles SPA	0.00	0.0000	2.45	0.0228	2.27	0.0211			
St Abbs Head to Fast Castle	0.02	0.0004	28.56	0.7271	14	0.3564			
St Kilda SPA	0.00	0.0000	0.98	0.0892	0.91	0.0826			
Troup, Pennan and Lions Head	0.02	0.0004	25.65	0.4237	23.8	0.3931			
West Westray SPA	0.05	0.0018	3.93	0.136	3.38	0.1167			

Table 6-10. Puffin Project alone and in-combination (including 'inc' or excluding 'exc' Berwick Bank impacts) low displacement mortality (60% displacement and 3% mortality for the breeding season / 1% mortality for the non-breeding season) and resultant percentage point change in annual adult survival rate. 'X' indicates when a PVA was required (see text for details on thresholds). Cells are highlighted when change in survival rate ≥0.02% or Project-alone annual mortality ≥ 0.2. Highlighted SPA names indicate a PVA was run for that SPA population.

SPA	Project alone		In-combination (inc. Berwick Bank)		In-combination (exc. Berwick Bank)		PVA required for:		
	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Project alone	In-combination (inc. Berwick Bank)	In-combination (exc. Berwick Bank)
Canna and Sanday	0.00	0.0000	0.78	0.0078	0.78	0.0078			
Cape Wrath	0.00	0.0000	1.34	0.0298	1.34	0.0298			
Coquet Island SPA	0.68	0.0014	28.46	0.0569	21.37	0.0427		X	X
Fair Isle	0.18	0.0013	5.08	0.0381	4.34	0.0326			
Farne Islands	2.21	0.0025	75.98	0.0868	45.04	0.0515		X	X
Flannan Isles	0.00	0.0000	2.72	0.0027	2.71	0.0027			
Forth Islands	3.44	0.0040	172.87	0.2014	143.05	0.1666		X	X
Foula	0.37	0.0044	6.72	0.0793	5.16	0.061		X	X
Hermaness, Saxa Vord and Valla Field	0.39	0.0014	6.43	0.0223	4.79	0.0167		X	
Hoy	0.06	0.0067	1.94	0.2252	1.7	0.1971			
Mingulay and Berneray	0.00	0.0000	0.01	0.0001	0	0.0001			
North Caithness Cliffs	0.02	0.0003	31.16	0.5126	31.05	0.5108			
North Rona and Sula Sgeir	0.00	0.0000	0.11	0.0016	0.11	0.0016			
Noss	0.01	0.0006	0.4	0.0171	0.35	0.0147			
The Shiant Isles	0.01	0.0000	10.8	0.0083	10.77	0.0083			
St Kilda	0.02	0.0000	16.59	0.0084	16.52	0.0084			
Sule Skerry and Sule Stack	48.54	0.0508	48.65	0.0509	48.62	0.0509	X	X	X

Table 6-11. Puffin Project alone and in-combination (including 'inc' or excluding 'exc' Berwick Bank impacts) high displacement mortality (60% displacement and 5% mortality for the breeding season / 3% mortality for the non-breeding season) and resultant percentage point change in annual adult survival rate. 'X' indicates when a PVA was required (see text for details on thresholds). Cells are highlighted when change in survival rate ≥0.02% or Project-alone annual mortality ≥ 0.2. Highlighted SPA names indicate a PVA was run for that SPA population.

SPA	Project alone		In-combination (inc. Berwick Bank)		In-combination (exc. Berwick Bank)		PVA required for:		
	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	Project alone	In-combination (inc. Berwick Bank)	In-combination (exc. Berwick Bank)
Canna and Sanday	0.00	0.0000	1.30	0.0131	1.30	0.0131			
Cape Wrath	0.00	0.0000	2.23	0.0497	2.23	0.0497			
Coquet Island SPA	2.05	0.0041	62.22	0.1243	46.61	0.0931		X	X
Fair Isle	0.53	0.0040	12.32	0.0924	10.1	0.0758		X	X
Farne Islands	6.62	0.0076	174.51	0.1994	110.68	0.1265		X	X
Flannan Isles	0.01	0.0000	4.57	0.0046	4.55	0.0046			
Forth Islands	10.31	0.0120	362.67	0.4225	293.88	0.3423		X	X
Foula	1.12	0.0132	19.28	0.2277	14.62	0.1727		X	X
Hermaness, Saxa Vord and Valla Field	1.18	0.0041	19.21	0.0668	14.31	0.0498		X	X
Hoy	0.17	0.0198	4.49	0.5216	3.76	0.4374			
Mingulay and Berneray	0.00	0.0000	0.02	0.0004	0.01	0.0003			
North Caithness Cliffs	0.05	0.0008	52.28	0.8601	52.01	0.8557			
North Rona and Sula Sgeir	0.00	0.0000	0.19	0.0029	0.18	0.0028			
Noss	0.04	0.0017	0.96	0.0408	0.79	0.0337			
The Shiant Isles	0.02	0.0000	18.15	0.0140	18.06	0.014			
St Kilda	0.05	0.0000	27.99	0.0142	27.79	0.0141			
Sule Skerry and Sule Stack	80.92	0.0847	81.22	0.0851	81.14	0.085	X	X	X

Table 6-12. Fulmar Project alone low displacement mortality (20% displacement and 1% mortality) and high displacement mortality (20% displacement and 3% mortality) and resultant percentage point changes in annual adult survival rate. No in-combination assessment was undertaken for fulmar as no other OWF Projects had previously assessed fulmar for displacement impacts. Cells with a change in annual mortality of ≥ 0.2 were shaded. As change in background mortality is <0.02% for all SPAs, no PVAs were required (therefore 'PVA required' cells are blank).

SPA	Project alone low displacement		Project alone high displacement		PVA required
	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	
Buchan Ness to Collieston Coast SPA	0.036	0.002	0.109	0.007	
Calf of Eday SPA	0.057	0.001	0.171	0.004	
Cape Wrath SPA	0.062	0.002	0.187	0.006	
Copinsay SPA	0.050	0.002	0.149	0.005	
East Caithness Cliffs SPA	0.455	0.002	1.366	0.005	
Fair Isle SPA	0.759	0.001	2.277	0.004	
Fetlar	0.218	0.001	0.653	0.004	
Flamborough and Filey Coast	0.023	0.001	0.069	0.004	
Flannan Isles SPA	0.003	0.000	0.010	0.000	
Foula SPA	0.485	0.002	1.454	0.007	
Fowlsheugh SPA	0.005	0.001	0.016	0.002	
Handa SPA	0.007	0.000	0.020	0.001	
Hermaness, Saxa Vord and Valla Field SPA	0.173	0.001	0.520	0.002	
Hoy SPA	1.444	0.004	4.331	0.011	
Mingulay and Berneray SPA	0.039	0.000	0.116	0.001	
North Caithness Cliffs SPA	0.917	0.003	2.751	0.009	
North Rona and Sula Sgeir SPA	0.029	0.001	0.088	0.002	
Noss SPA	0.129	0.001	0.388	0.004	
Rousay SPA	0.051	0.001	0.152	0.003	
Shiant Isles SPA	0.020	0.001	0.059	0.002	
St Kilda SPA	0.144	0.000	0.433	0.001	
Sumburgh Head SPA	0.011	0.000	0.034	0.000	

SPA	Project alone low displacement		Project alone high displacement		PVA required
	Annual mortality	Change in adult survival rate (%)	Annual mortality	Change in adult survival rate (%)	
Troup, Pennan and Lions Head	0.049	0.001	0.148	0.004	
West Westray SPA	0.026	0.001	0.078	0.003	

Table 6-13. Great skua Project alone collision mortality and resultant percentage point changes in annual adult survival rate. No quantitative in-combination assessment was undertaken for great skua as no other OWF Projects had previously undertaken a quantitative assessment for great skua impacts. As change in background mortality is <0.02% for all SPAs, no PVAs were required (therefore 'PVA required' cells are blank). Note Hoy SPA was the only for which another wind farm has presented an assessment (Berwick Bank) hence a separate consideration for in-combination impacts with this wind farm has been included.

SPA	Annual mortality	Change in adult survival rate (%)	PVA required
Fair Isle SPA	0.006	0.00071	
Fetlar SPA	0.013	0.00076	
Foula SPA	0.037	0.00101	
Handa SPA	0.001	0.00015	
Hermaness, Saxa Vord and Valla Field SPA	0.022	0.00106	
Hoy SPA – West of Orkney OWF	0.052	0.00185	
Hoy SPA – West of Orkney OWF + Berwick Bank OWF	0.102	0.00363	
Noss SPA	0.010	0.00109	
St Kilda SPA	0.000	0.00001	
Ronas Hill – North Roe and Tingon SPA	0.004	0.00111	

266. For all SPAs, where change in annual adult survival rate from Project alone impacts were < 0.02%, a PVA was not required to further assess population response to predicted Project alone impacts. For in-combination impacts, where change in adult annual survival rate from in-combination impacts were <0.02% and Project alone mortality was also <0.2 birds per annum, no PVA was required. For these SPAs, impacts on SPA populations are sufficiently low to not warrant further modelling and assessment.

267. Consequently, a conclusion of no adverse effect on site integrity was reached for the following sites: Ailsa Craig SPA, Auskerry SPA, Canna and Sanday SPA, Copeland Islands SPA, Fetlar SPA, Flannan Isles SPA, Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island SPA, Mingulay and Berneray SPA, Mousa SPA, North Rona and Sula Sgeir SPA, Priest Island (Summer Isles) SPA, Island SPA, Ronas Hill - North Roe and Tingon SPA, Rum SPA, Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA, Sumburgh Head SPA, Shiant Isles SPA, Treshnish Isles SPA,.

268. All SPAs for which a PVA was run for one or more features are considered in more detail below under an SPA-specific account. For each SPA account, a description of the site is provided, including the site's conservation objectives and a list of qualifying features and their status. The potential for the Project to impact the site is then considered, with impact pathways identified and impacts from the Project-alone and in-combination are presented. Where relevant, these impacts are broken down by season and impact pathway (e.g. collision and displacement impacts). Finally, the SPA population response to predicted impacts is presented, including PVA metrics and a conclusion on the potential for these impacts to result in an adverse effect on site integrity is drawn.

269. The location of SPAs closer to the offshore Project are shown in **Figure 6-3**for reference.

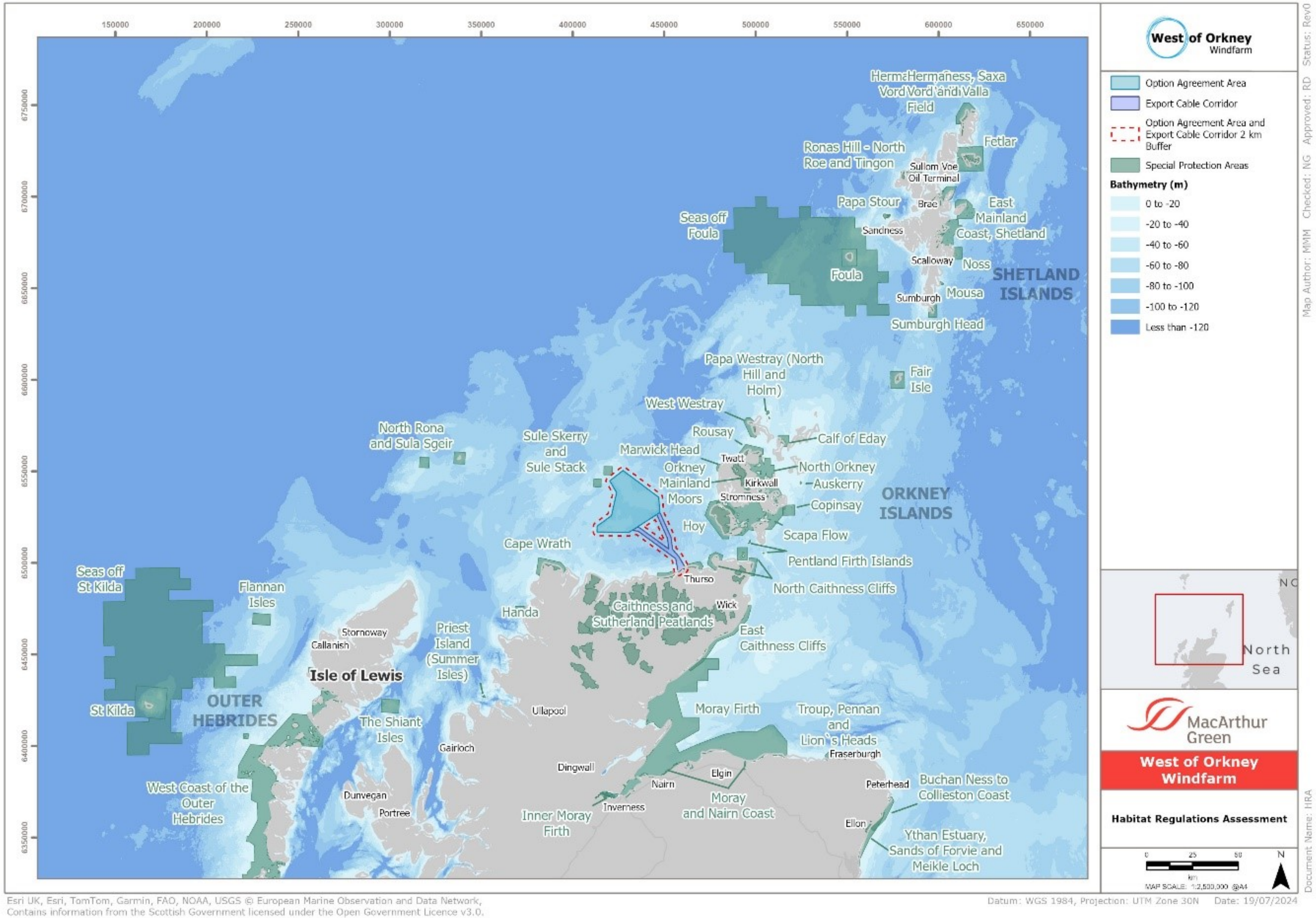


Figure 6-3. Map of northern Scotland showing the Offshore Project Area including a 2 km buffer. SPAs with breeding seabird qualifying features and marine SPAs are indicated.

6.3.2 Buchan Ness to Collieston Coast SPA

6.3.2.1 *Site description*

270. The Buchan Ness to Collieston Coast SPA was classified on 30 March 1998 (with a marine extension classified on 25 September 2009) due to the populations of breeding seabirds. The site is on the east Aberdeenshire coast and is approximately 200 km south-east of the Project.

271. 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.

6.3.2.2 *Conservation Objectives for the SPA*

272. The conservation objectives of the Buchan Ness to Collieston Coast SPA are:

- To avoid deterioration of the habitats of the qualifying species (listed below) or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and
- 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;
- No significant disturbance of the species.

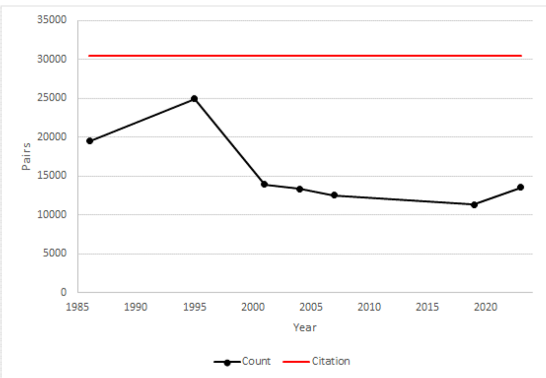
6.3.2.3 *Qualifying features*

273. The qualifying features of the SPA are presented below in **Table 6-14**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*. Buchan Ness to Collieston Coast SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 95,000 seabirds including nationally important populations of the following species: black-legged kittiwake, common guillemot, herring gull, European shag and Northern fulmar.

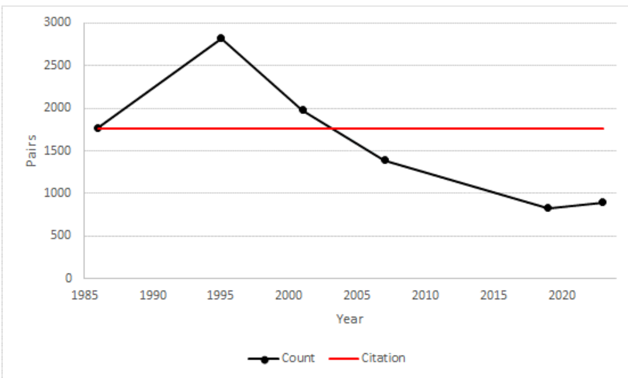
Table 6-14. Qualifying interests and condition for the Buchan Ness to Collieston Coast SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake* (breeding)	30,452 pairs, 6.2% of the GB population	11,295 pairs	Unfavourable No Change	1 June 2019	Red
Herring gull* (breeding)	4,292 pairs, 2.7% of the GB population	2,077 pairs	Unfavourable Declining	1 June 2023	Red
Guillemot* (breeding)	8,640 pairs, 1.2% of GB population	29,433 individuals	Favourable Maintained	1 June 2019	Amber
Fulmar* (breeding)	1,765 pairs, 0.3% of the GB population	826 pairs	Unfavourable No Change	1 June 2023	Amber
Shag* (breeding)	1,045 pairs, 2.7% of the GB population	369 pairs	Unfavourable Recovering	1 June 2023	Red
Seabird assemblage (breeding)	Regularly supports 95,000 seabirds including nationally important populations	n/a	Favourable Recovered	16 June 2017	n/a

274. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) colony count data from the period 1986 to 2023 was extracted from the SMP database. These counts were plotted and compared with the citation population size (**Figure 6-4**).



Kittiwake



Fulmar

Figure 6-4 Buchan Ness to Collieston Coast SPA qualifying feature population trends from 1986 - 2023 (citation population size shown by red line).

6.3.2.4 *Potential for the Project to impact the site's conservation objectives*

275. The Buchan Ness to Collieston Coast SPA is 200 km from the Project OAA plus 2 km buffer boundary. However, species from this SPA could be using the OAA for foraging and other key behaviours or passing through the site on passage. Theoretical connectivity and LSE were established for this site (see **Appendix 2 - HRA: HRA Screening Technical Report**)

276. The Buchan Ness to Collieston Coast SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

277. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

278. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

279. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.2.5 *Assessment of predicted impacts for Project alone and in-combination*

280. An in-combination assessment was undertaken that collated quantitative information on impacts to features of this SPA from published consent applications. Note that no other OWFs have been required to undertake a quantitative assessment of fulmar displacement/barrier impacts and so an in-combination assessment was not possible for this species. This was discussed and agreed with NatureScot (consultation meeting, 11 June 2024).

281. Other reasonably foreseeable projects which have not yet submitted an application may also impact some of the qualifying features of this site. MD-LOT advised (by email, 10 June 2024) that a qualitative assessment of OWF projects for which a Scoping Opinion has been adopted should be undertaken.

282. OWF projects for which a Scoping Opinion has been adopted and which identified possible impacts from their project on the Buchan Ness to Collieston Coast SPA, in their Scoping Reports, are listed in **Table 6-15**.

Table 6-15. OWF projects for which a Scoping Opinion has been adopted but no application submitted. 'Y' indicates this SPA and feature was mentioned in that project's scoping report. Only features which could be impacted by Project impacts are listed

SPA qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Kittiwake	Y			Y		Y
Fulmar	Y	Y		Y		Y

283. The predicted impacts from these projects have not been considered in the quantitative assessment of the impacts from the Project in-combination with other reasonably foreseeable projects, as it is assumed that these projects will need to consider this Project in their in-combination assessments.

6.3.2.5.1 Kittiwake

284. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Buchan Ness to Collieston Coast SPA population is presented in **Table 6-16**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-16. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities apportioned to the Buchan Ness to Collieston Coast SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.11	0.02	0.11	0.06
Mortality - Non-breeding season (NatureScot)	0.82	0.13	0.82	0.39
Mortality - Autumn migration (BDMPS)	0.30	0.04	0.30	0.13
Mortality - Spring migration (BDMPS)	0.52	0.10	0.52	0.26
Annual Project alone mortality* (collision + displacement)	1.08		1.38	
Percentage point change in annual adult survival rate	<0.01%		<0.011%	
Annual in-combination mortality excl Berwick Bank	54.59		67.05	
Percentage point change in annual adult survival rate	0.24%		0.30%	
Annual in-combination mortality incl Berwick Bank	78.32		98.77	

MacArthur Green

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Percentage point change in annual adult survival rate	0.35%		0.44%	

** Sum of collision plus displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.*

285. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

286. As change in adult survival rate due to in-combination impacts did exceed 0.02%, and as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

287. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

288. **Table 6-17** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the kittiwake population at Buchan Ness to Collieston Coast SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

289. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-17. Buchan Ness to Collieston Coast SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'low' OR 'High' = low or high displacement mortality scenario, 'ex BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	1.1	0.00004767535	25	0.9999	0.9999	0.0007	0.9985	1.0012	0.9987	0.9985	0.0185	0.9630	1.0337	49.9	50.1
Project alone CRM+High	1.4	0.00006097109	25	0.9999	0.9999	0.0007	0.9984	1.0012	0.9979	0.9978	0.0179	0.9616	1.0327	49.9	50.1
Incomb CRM+Low ex. BB	54.6	0.00241649961	25	0.9971	0.9971	0.0007	0.9958	0.9985	0.9288	0.9285	0.0173	0.8954	0.9625	41.3	58.1
Incomb CRM+High ex. BB	67.0	0.00296795937	25	0.9965	0.9965	0.0007	0.9951	0.9979	0.9129	0.9128	0.0171	0.8771	0.9462	39.1	59.6
Incomb CRM+Low inc. BB	78.3	0.00346686506	25	0.9959	0.9959	0.0007	0.9945	0.9972	0.8989	0.8989	0.0166	0.8670	0.9319	37.7	61.4
Incomb CRM+High inc. BB	98.8	0.00437226056	25	0.9948	0.9948	0.0007	0.9934	0.9962	0.8724	0.8733	0.0170	0.8405	0.9075	34.5	64.3
Project alone CRM+Low	1.1	0.00004767535	35	1.0000	1.0000	0.0006	0.9988	1.0012	0.9984	0.9989	0.0217	0.9572	1.0437	49.6	50.8
Project alone CRM+High	1.4	0.00006097109	35	0.9999	0.9999	0.0006	0.9988	1.0010	0.9967	0.9969	0.0215	0.9549	1.0404	49.3	50.8
Incomb CRM+Low ex. BB	54.6	0.00241649961	35	0.9971	0.9971	0.0006	0.9960	0.9983	0.9023	0.9026	0.0192	0.8640	0.9441	41.5	59.1
Incomb CRM+High ex. BB	67.0	0.00296795937	35	0.9965	0.9965	0.0006	0.9953	0.9977	0.8823	0.8817	0.0193	0.8423	0.9213	39.6	60.9
Incomb CRM+Low inc. BB	78.3	0.00346686506	35	0.9959	0.9959	0.0006	0.9948	0.9971	0.8629	0.8631	0.0191	0.8265	0.9010	37.1	62.6
Incomb CRM+High inc. BB	98.8	0.00437226056	35	0.9948	0.9948	0.0006	0.9935	0.9959	0.8291	0.8292	0.0185	0.7915	0.8665	34.4	65.5
Project alone CRM+Low	1.1	0.00004767535	50	1.0000	1.0000	0.0005	0.9989	1.0009	0.9976	0.9983	0.0267	0.9455	1.0522	49.9	50.1
Project alone CRM+High	1.4	0.00006097109	50	0.9999	0.9999	0.0005	0.9989	1.0009	0.9955	0.9963	0.0263	0.9449	1.0491	49.9	50.1
Incomb CRM+Low ex. BB	54.6	0.00241649961	50	0.9980	0.9980	0.0005	0.9970	0.9989	0.9021	0.9021	0.0239	0.8569	0.9482	41.3	57.9
Incomb CRM+High ex. BB	67.0	0.00296795937	50	0.9975	0.9975	0.0005	0.9965	0.9985	0.8816	0.8814	0.0243	0.8328	0.9279	39.6	59.2
Incomb CRM+Low inc. BB	78.3	0.00346686506	50	0.9971	0.9971	0.0005	0.9961	0.9982	0.8621	0.8628	0.0231	0.8176	0.9120	38.8	61.0
Incomb CRM+High inc. BB	98.8	0.00437226056	50	0.9963	0.9963	0.0005	0.9953	0.9973	0.8285	0.8288	0.0232	0.7845	0.8731	35.4	64.0

290. Predicted Project alone impacts on the kittiwake population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

291. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9948 (95% c.i. 0.9933-0.9959) (**Table 6-17**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.52%. This predicted small change to population growth rate indicates that the kittiwake population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of only 1.4 birds per annum to the in-combination total of 98.8 birds per annum (including Berwick Bank impacts, worst case scenario).

292. The kittiwake population at this SPA is well below the citation population size and feature condition is Unfavourable No Change. However, the population has been stable over the last 20 years. Kittiwake populations are known to have been impacted by the Highly Pathogenic Avian Influenza (HPAI) epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). However, counts at the Buchan Ness to Collieston Coast SPA in 2023 found a 20% increase in kittiwake AONs at this site, suggesting HPAI has not impacted this population.

293. Given the small predicted reduction in population growth rate in the presence of in-combination impacts and evidence that this population is stable and has not been impacted by HPAI, a conclusion of no AEoSI was reached for the kittiwake feature of the Buchan Ness to Collieston Coast SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.2.5.2 Fulmar

294. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the Buchan Ness to Collieston Coast SPA population is presented in **Table 6-18**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features.

Table 6-18. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities apportioned to the Buchan Ness to Collieston Coast SPA and change in baseline annual adult survival rate

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities.*

FULMAR	Low Displacement (20% / 1%)	High Displacement (20% / 3%)
Mortality - Breeding season (NatureScot)	0.001	0.002
Mortality - Non-breeding season (NatureScot)	0.036	0.107
Mortality - Autumn migration (BDMPS)	0.014	0.042
Mortality - Winter (BDMPS)	0.005	0.016
Mortality - Spring migration (BDMPS)	0.016	0.049
Annual Project alone mortality (displacement/barrier)*	0.037	0.109
Percentage point change in annual adult survival rate	0.002%	0.007%

** Sum of displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.*

295. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required.

296. The fulmar population at this SPA is well below the citation population size and feature condition is Unfavourable Declining. After a peak well above the citation population size in 1995, the population has undergone a steady decline with recent counts suggesting the population has stabilised at a smaller population size. There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmars were undertaken in 2023 (Tremlett *et al.*, 2024).

297. Whilst this feature has undergone a decline and is in Unfavourable Declining condition, the very small predicted mortality from Project impacts, of 0.1 birds per annum, on this population will not prevent or reduce the potential for this population to recover. Consequently, a conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Buchan Ness to Collieston Coast SPA**, from displacement and barrier impacts from the **Project alone**. No in-combination assessment was undertaken for fulmar.

6.3.2.6 Conclusions

298. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Buchan Ness to Collieston Coast SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

299. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Buchan Ness to Collieston Coast SPA**, from displacement impacts from the **Project alone**.

300. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, and fulmar, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Buchan Ness to Collieston Coast SPA**.

301. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Buchan Ness to Collieston Coast SPA** was reached

6.3.3 Calf of Eday SPA

6.3.3.1 Site description

302. The Calf of Eday SPA was classified on 29 June 1998, with a marine extension classified on 25 September 2009, due to the populations of breeding seabirds. The site is in the Orkney Islands and is approximately 72 km east of the Project.

303. Calf of Eday SPA is a small maritime island to the north of Eday in Orkney. The Calf of Eday SPA has a rocky shoreline with cliffs to the north and the west. The island is covered by maritime heath and grassland. These cliffs support a colony of breeding seabirds.

304. The boundary of the SPA overlaps with the boundary of Calf of Eday SSSI, and the seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface.

6.3.3.2 Conservation Objectives for the SPA

305. The conservation objectives of the Calf of Eday SPA are:

- 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
- 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.

6.3.3.3 Qualifying features

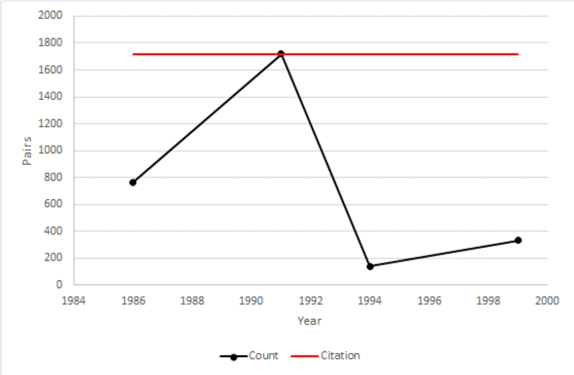
306. The qualifying features of the SPA are presented below in **Table 6-19**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

Table 6-19. Qualifying interests and condition for the Calf of Eday SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake* (breeding)	1,717 pairs, 0.4% of the GB population	336 pairs	Unfavourable No Change	15 May 2022	Red
Great black-backed gull* (breeding)	938 pairs (1,876 individuals), 5% of the GB population	58 pairs (116 individuals)	Unfavourable Declining	15 May 2022	Amber
Guillemot* (breeding)	12,645 individuals, 1% of the GB population	3, 493 individuals	Unfavourable No Change	15 May 2022	Amber
Fulmar* (breeding)	1,955 pairs, 0.4% of the GB population	2,324 pairs	Favourable Maintained	15 May 2022	Amber
Cormorant* (breeding)	223 pairs, 3% of the GB population	187 pairs	Favourable Maintained	15 May 2022	Green
Seabird assemblage (breeding)	Regularly supports 30,000 seabirds including nationally important populations	n/a	Unfavourable No Change	15 May 2022	n/a

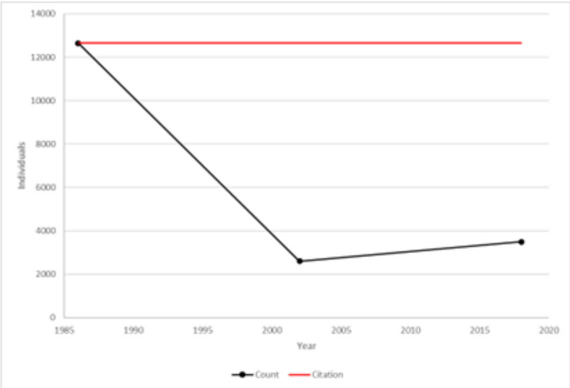
307. The Calf of Eday SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 30,000 seabirds including nationally important populations of the following species: black-legged kittiwake, common guillemot, great cormorant, great black-backed gull and Northern fulmar.

308. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) colony count data from the period 1986 to 2016-18 was extracted from the SMP database. These counts were plotted and compared with the citation population size (**Figure 6-5**).

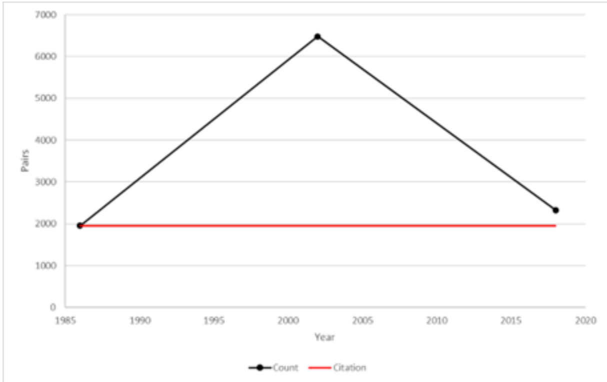


Kittiwake

Great black-backed gull



Guillemot



Fulmar

Figure 6-5. Calf of Eday SPA qualifying feature population trends from 1990 - 2022 (citation population size shown by red line).

6.3.3.4 *Potential for the Project to impact the site's Conservation Objectives*

309. The Calf of Eday SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Collision impacts from the offshore Project during operation on the **great black-backed gull** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **common guillemot** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **black-legged kittiwake** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **Northern fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

310. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

311. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

312. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.3.5 Assessment of predicted impacts for Project alone and in-combination

313. An in-combination assessment was undertaken that collated quantitative information on impacts to features of this SPA from published consent applications. Note that no other OWFs have been required to undertake a quantitative assessment of fulmar displacement/barrier impacts and so an in-combination assessment was not possible for this species. This was discussed and agreed with NatureScot (consultation meeting, 11 June 2024).

314. Other reasonably foreseeable projects which have not yet submitted an application may also impact some of the qualifying features of this site. MD-LOT advised (by email, 10 June 2024) that a qualitative assessment of OWF projects for which a Scoping Opinion has been adopted should be undertaken.

315. OWF projects for which a Scoping Opinion has been adopted and which identified possible impacts from their project on the Calf of Eday SPA, in their Scoping Reports, are listed **Table 6-20.**

Table 6-20. OWF projects for which a Scoping Opinion has been adopted but no application submitted. 'Y' indicates this SPA and feature was mentioned in that project's scoping report

SPA qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Black-legged kittiwake						Y
Common guillemot						Y
Great black-backed gull						Y
Northern fulmar						Y

316. The predicted impacts from these projects have not been considered in the quantitative assessment of the impacts from the Project in-combination with other reasonably

foreseeable projects, as it is assumed that these projects will need to consider this Project in their in-combination assessments.

6.3.3.5.1 Kittiwake

317. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the population is presented in **Table 6-21**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-21. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities apportioned to the Calf of Eday SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.02	0.00	0.02	0.01
Mortality - Non-breeding season (NatureScot)	0.05	0.01	0.05	0.02
Mortality - Autumn migration (BDMPS)	0.02	0.00	0.02	0.01
Mortality - Spring migration (BDMPS)	0.03	0.01	0.03	0.02
Annual Project alone mortality* (collision + displacement)	0.08		0.11	
Percentage point change in annual adult survival rate	0.01%		0.0156%	
Annual in-combination mortality excl. Berwick Bank	2.09		2.24	
Percentage point change in annual adult survival rate	0.31%		0.33%	
Annual in-combination mortality incl. Berwick Bank	2.48		2.82	
Percentage point change in annual adult survival rate	0.37%		0.42%	

** Sum of collision plus displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.*

318. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

319. Change in adult survival rate due to in-combination impacts did exceed 0.02%, but as Project alone mortality was less than 0.2 birds per annum, no PVA was required to assess in-combination impacts.

320. The kittiwake population at this SPA is well below the citation population size and feature condition is Unfavourable No Change. However, the population appears to have been stable

over recent years, albeit at a much smaller population size than at citation. Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). However, this site was not counted in 2023 so any change in population size due to HPAI is unknown.

321. Given the very small impacts on this population and evidence that this population is stable, a conclusion of no AEoSI was reached for the kittiwake feature of the Calf of Eday SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.3.5.2 Great black-backed gull

322. Predicted great black-backed collision mortality, by season, and change to annual adult survival rate apportioned to the Calf of Eday SPA population is presented in **Table 6-22**. In-combination impacts from other OWFs, with the Project impacts, are also presented. NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts (letter from NatureScot to the Project, dated 3 June 2024). Berwick Bank Wind Farm did not undertake a quantitative assessment for great black-backed gull because this species was rarely seen within their offshore development area. Therefore, only one set of in-combination impacts are presented.

Table 6-22. Estimated adult great black-backed gull Project alone and in-combination collision seasonal and annual mortalities apportioned to the Calf of Eday SPA and change in baseline annual adult survival rate.

See ***Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts*** *for more details on calculation of mortalities and changes to survival rate.*

GREAT BLACK-BACKED GULL	Collision (WCS)
Mortality - Breeding season (NatureScot)	0.01
Mortality - Non-breeding season (NatureScot)	0.07
Mortality - Non-breeding season (BDMPS)	0.07
Annual Project alone mortality* (collision)	0.08
Percentage point change in annual adult survival rate	0.07%
Annual in-combination mortality	5.05
Percentage point change in annual adult survival rate	4.35%

** Sum of collision mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.*

323. As change in adult survival rate from the Project alone impacts exceeded the 0.02% threshold, a PVA was required for Project alone impacts.

324. Change in adult survival rate due to in-combination impacts did exceed 0.02%, but Project alone mortality was less than 0.2 birds per annum, so a PVA was not required to assess in-combination impacts.

325. **Table 6-23** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the great black-backed gull population at Calf of Eday SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30

years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

326. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-23. Calf of Eday SPA: Great black-backed gull PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM	0.1	0.0007139509	25	0.9992	0.9992	0.0030	0.9933	1.0054	0.9754	0.9812	0.0807	0.8390	1.1557	48.8	51.8
Project alone CRM	0.1	0.0007139509	35	0.9992	0.9992	0.0022	0.9946	1.0038	0.9669	0.9738	0.0810	0.8312	1.1471	48.5	51.8
Project alone CRM	0.1	0.0007139509	50	0.9995	0.9994	0.0015	0.9963	1.0026	0.9675	0.9738	0.0811	0.8313	1.1470	48.5	51.6

327. The C-PGR for the Project alone after 35 years for the worst case scenario collision mortality was 0.9992 (95% c.i. 0.9946-1.0038) (**Table 6-23**). The predicted reduction in population growth rate under this highest impact worst case scenario was <0.08%. This very small change indicates that the PVA trajectories with Project-alone impacts are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the great black-backed gull population will be of a similar size after 35 years, in the presence of Project impacts, as would be expected in the absence of Project impacts.

328. The great black-backed gull population at this SPA is well below the citation population size and feature condition is Unfavourable Declining. The population is now greatly reduced, at 60 pairs in the most recent count, compared to citation although the population does appear to have stabilised in recent years. Great black-backed gull populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). This site was not counted in 2023 so any change in population size due to HPAI is unknown but the two other Scottish colonies which were counted (Hoy and Copinsay) showed a 44% and 27% decrease, suggesting the Calf of Eday SPA population could also have declined due to HPAI.

329. The great black-backed gull feature of the Calf of Eday SPA has substantially declined since the mid 1990s and may have undergone a further decline recently due to HPAI impacts. However, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not further exacerbate any declines and will not prevent or reduce the potential for this population to recover.

330. Consequently, a conclusion of no AEoSI was reached for the great black-backed gull feature of the Calf of Eday SPA, from collision impacts from the Project alone and in-combination with other OWFs.

6.3.3.5.3 Guillemot

331. Predicted guillemot displacement mortality, by season, and change to annual adult survival rate apportioned to the Calf of Eday SPA population is presented in **Table 6-24**. In-combination impacts from other OWFs, with the Project impacts, are also presented. NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts (letter from NatureScot to the Project, dated 3 June 2024). However, Berwick Bank Wind Farm did not have connectivity with any of the SPAs potentially impacted by the Project and so the in-combination assessment does not include any Berwick Bank impacts. Note, almost all Project alone breeding season guillemot mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-24. Estimated adult guillemot Project alone and in-combination displacement seasonal and annual mortalities apportioned to the Calf of Eday SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

GUILLEMOT	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.13	0.40
Mortality - Non-breeding season (BDMPS)	0.13	0.40
Annual Project alone mortality* (displacement)	0.13	0.40
Percentage point change in annual adult survival rate	<0.01%	0.01%
Annual in-combination mortality	2.04	5.82
Percentage point change in annual adult survival rate	0.04%	0.12%

** Sum of displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.*

332. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

333. As change in adult survival rate due to in-combination impacts did exceed 0.02%, and as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

334. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

335. **Table 6-25** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the guillemot population at the Calf of Eday SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

336. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse

effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-25. Calf of Eday SPA: Guillemot PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	0.1	0.000028	25	1.0000	1.0000	0.0009	0.9981	1.0017	0.9982	0.9989	0.0246	0.9503	1.0457	48.4	50.6
Project alone High	0.4	0.000085	25	0.9999	0.9999	0.0009	0.9981	1.0017	0.9962	0.9973	0.0242	0.9499	1.0455	48.1	51.1
Incomb Low	2.0	0.000435	25	0.9995	0.9995	0.0009	0.9977	1.0014	0.9876	0.9870	0.0243	0.9404	1.0380	47.4	53.3
Incomb High	5.8	0.001243	25	0.9986	0.9986	0.0009	0.9968	1.0004	0.9647	0.9641	0.0240	0.9170	1.0123	42.3	59.4
Project alone Low	0.1	0.000028	35	1.0000	0.9999	0.0007	0.9985	1.0014	0.9979	0.9982	0.0273	0.9441	1.0530	50.5	49.6
Project alone High	0.4	0.000085	35	0.9999	0.9999	0.0008	0.9985	1.0014	0.9952	0.9965	0.0276	0.9453	1.0521	49.3	50.5
Incomb Low	2.0	0.000435	35	0.9995	0.9995	0.0007	0.9980	1.0011	0.9821	0.9824	0.0273	0.9294	1.0377	46.5	52.3
Incomb High	5.8	0.001243	35	0.9986	0.9986	0.0008	0.9971	1.0002	0.9511	0.9515	0.0265	0.9024	1.0052	39.7	59.0
Project alone Low	0.1	0.000028	50	1.0000	1.0000	0.0006	0.9989	1.0011	0.9985	0.9984	0.0300	0.9408	1.0592	49.5	50.3
Project alone High	0.4	0.000085	50	0.9999	0.9999	0.0006	0.9988	1.0012	0.9960	0.9966	0.0299	0.9426	1.0576	49.5	50.7
Incomb Low	2.0	0.000435	50	0.9997	0.9997	0.0006	0.9985	1.0008	0.9834	0.9831	0.0301	0.9248	1.0451	47.0	52.6
Incomb High	5.8	0.001243	50	0.9990	0.9990	0.0006	0.9979	1.0002	0.9505	0.9515	0.0296	0.8925	1.0112	41.4	58.3

337. Predicted Project alone impacts on the guillemot population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

338. The C-PGR for the Project in-combination with other OWFs after 35 years for the high displacement impact scenario, was 0.9986 (95% c.i. 0.9971-1.0002) (**Table 6-25**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.14%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the guillemot population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Additionally, the Project contributed a mortality of only 0.4 birds per annum to the in-combination total of 5.82 birds per annum.

339. The guillemot population at this SPA is well below the citation population size and feature condition is Unfavourable Declining. However, the population appears to have been stable for many years, albeit approximately half of the citation population size, at 5,524 individuals in 2018. Guillemot populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). This Calf of Eday SPA guillemot population was not counted in 2023 so any change in population size due to HPAI is unknown. Two other Orkney colonies which were counted in 2023 showed marked differences in their populations, with a 56% decline at Copinsay and a 7% increase at West Westray. Consequently, it is very difficult to predict whether the Calf of Eday SPA guillemot population has remained stable or decreased due to HPAI impacts.

340. Whilst the guillemot population at the Calf of Eday SPA is substantially smaller than the citation population size and could have declined further due to HPAI impacts, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not further exacerbate any declines and will not prevent or reduce the potential for this population to recover.

341. Consequently, a conclusion of **no AEoSI** was reached for the **guillemot** feature of the **Calf of Eday SPA**, from displacement impacts from the **Project alone and in-combination** with other OWFs.

6.3.3.5.4 Fulmar

342. Predicted fulmar displacement and barrier mortality, by season, and change to annual adult survival rate apportioned to the Calf of Eday SPA population is presented in **Table 6-26**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features.

Table 6-26. Estimated adult fulmar Project alone seasonal and annual mortalities apportioned to the Calf of Eday SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

FULMAR	Low Displacement (20%1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.013	0.039
Mortality - Non-breeding season (NatureScot)	0.044	0.132
Mortality - Autumn migration (BDMPS)	0.017	0.051
Mortality - Winter (BDMPS)	0.007	0.022
Mortality - Spring migration (BDMPS)	0.020	0.060
Annual Project alone mortality* (displacement)	0.057	0.171
Percentage point change in annual adult survival rate	0.001%	0.004%

** Sum of displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.*

343. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required.

344. The fulmar population at this SPA is well above the citation population size and feature condition is Favourable Maintained. There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmars were undertaken in 2023 (Tremlett *et al.*, 2024).

345. The fulmar population at the Calf of Eday SPA is stable and shows no evidence of any recent declines. The very small predicted impacts from the Project alone will not change the status of the population.

346. Consequently, a conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Calf of Eday SPA**, from displacement and barrier impacts from the **Project alone**. No in-combination assessment was undertaken for fulmar.

6.3.3.6 *Conclusions*

347. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Calf of Eday SPA,** from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

348. A conclusion of **no AEoSI** was reached for the **great black-backed gull** feature of the **Calf of Eday SPA,** from collision impacts from the **Project alone** and **in-combination** with other OWFs.

349. A conclusion of **no AEoSI** was reached for the **guillemot** feature of the **Calf of Eday SPA,** from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

350. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Calf of Eday SPA**, from displacement impacts from the **Project alone**.

351. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, great black-backed gull, guillemot and fulmar, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Calf of Eday SPA**.

352. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Calf of Eday SPA** was reached.

6.3.4 Cape Wrath SPA

6.3.4.1 *Site description*

353. The Cape Wrath SPA was classified on 15 March 1996, with a marine extension classified on 25 September 2009, due to the populations of breeding seabirds. The site is in north-west Sutherland and is approximately 26 km south-west of the Project.

354. Cape Wrath SPA covers two stretches of Torridonian sandstone and Lewisian gneiss cliff around Cape Wrath headland in north-west Scotland. These cliffs support large colonies of breeding seabirds.

355. The boundary of the SPA overlaps with the boundary of Cape Wrath SSSI, and the seaward extension extends approximately 2km into the marine environment to include the seabed, water column and surface.

6.3.4.2 *Conservation Objectives for the SPA*

The conservation objectives of the Cape Wrath SPA are to:

- 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
- 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.

6.3.4.3 *Qualifying features*

356. The qualifying features of the SPA are presented below in **Table 6-27**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

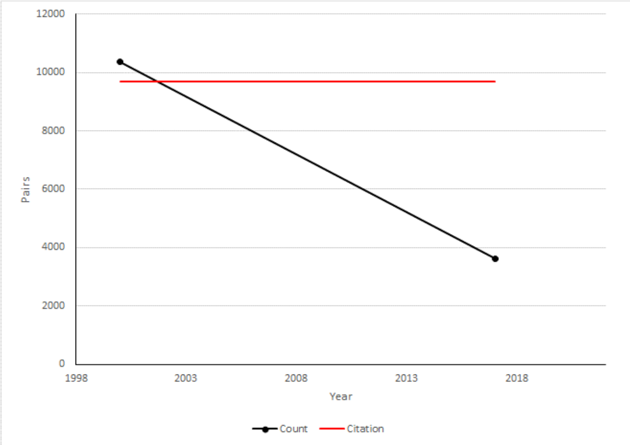
Table 6-27. Qualifying interests and condition for the Cape Wrath SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake*	9,700 pairs, 2% of the GB population	3,622 pairs	Unfavourable Declining	1 June 2023	Red

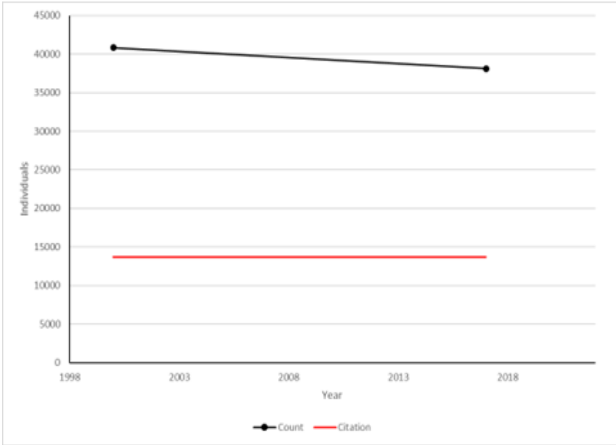
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Guillemot*	13,700 individuals, 1% of the GB population	38,109 individuals	Favourable Maintained	1 June 2023	Amber
Razorbill*	1,800 individuals, 1% of the GB population	3,246 individuals	Favourable Maintained	1 June 2023	Amber
Puffin*	5,900 pairs, 1.3% of the GB population	2,244 pairs	Unfavourable No change	5 July 2018	Red
Fulmar*	2,300 pairs, 0.4% of the GB population	1,477 pairs	Unfavourable Declining	1 June 2023	Amber
Seabird assemblage	Regularly supports 50,000 seabirds including nationally important populations	n/a	Favourable Maintained	5 July 2018	n/a

357. Cape Wrath SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 50,000 seabirds including nationally important populations of the following species: black-legged kittiwake, common guillemot, razorbill, Atlantic puffin and Northern fulmar.

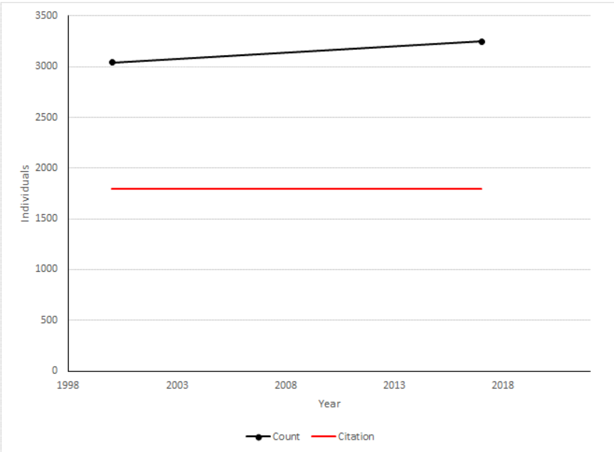
358. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) count data was extracted from the SMP database. These counts were plotted and compared with the citation population size (**Figure 6-6**).



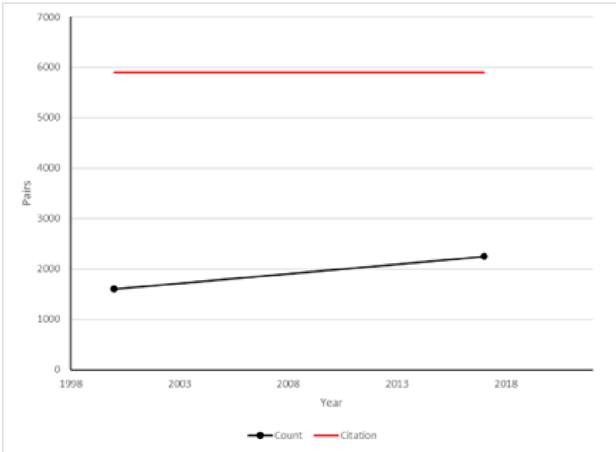
Kittiwake



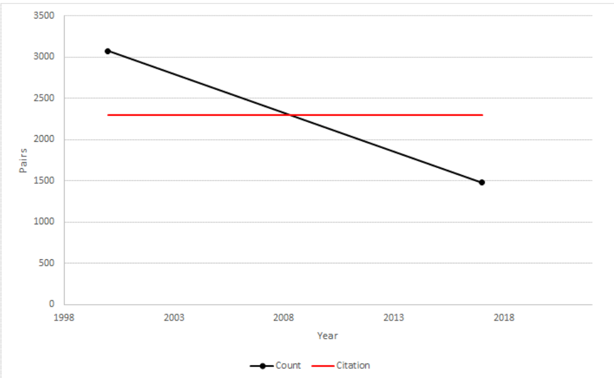
Guillemot



Razorbill



Puffin



Fulmar

Figure 6-6. Cape Wrath SPA qualifying feature population trends from 1990 - 2022 (citation population size shown by red line).

6.3.4.4 *Potential for the Project to impact the site's Conservation Objectives*

359. The Cape Wrath SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **guillemot** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **razorbill** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **puffin** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

360. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here..

361. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

362. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.4.5 *Assessment of predicted impacts for Project alone and in-combination*

363. An in-combination assessment was undertaken that collated quantitative information on impacts to features of this SPA from published consent applications. Note that no other OWFs have been required to undertake a quantitative assessment of fulmar displacement/barrier impacts and so an in-combination assessment was not possible for this species.

6.3.4.5.1 Kittiwake

364. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Cape Wrath SPA population is presented in **Table 6-28**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with

Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-28. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities apportioned to the Cape Wrath SPA and change in baseline annual adult survival rate.

***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	2.10	0.35	2.10	1.18
Mortality - Non-breeding season (NatureScot)	0.01	0.00	0.01	0.01
Mortality - Autumn migration (BDMPS)	0.00	0.00	0.00	0.00
Mortality - Spring migration (BDMPS)	0.01	0.00	0.01	0.00
Annual Project alone mortality* (collision + displacement)	2.47		3.29	
Percentage point change in annual adult survival rate	0.03%		0.05%	
Annual in-combination mortality excl Berwick Bank	3.43		4.48	
Percentage point change in annual adult survival rate	0.05%		0.06%	
Annual in-combination mortality incl Berwick Bank	3.52		4.61	
Percentage point change in annual adult survival rate	0.05%		0.06%	

** Sum of collision plus displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

365. As change in adult survival rate from the Project alone impacts exceeded the 0.02% threshold, a PVA was required for Project alone impacts.

366. Change in adult survival rate due to in-combination impacts also exceeded the 0.02% threshold and as Project alone mortality was more than 0.2 birds per annum, a PVA was also required to assess in-combination impacts.

367. **Table 6-29** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the kittiwake population at Cape Wrath SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the

Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

368. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-29. Cape Wrath SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	2.5	0.0003404688	25	0.9996	0.9996	0.0012	0.9973	1.0021	0.9885	0.9892	0.0324	0.9301	1.0620	49.0	51.4
Project alone CRM+High	3.3	0.0004546042	25	0.9995	0.9995	0.0012	0.9972	1.0018	0.9858	0.9874	0.0323	0.9250	1.0532	49.0	50.9
Incomb CRM+Low ex. BB	3.4	0.0004730786	25	0.9994	0.9994	0.0012	0.9971	1.0020	0.9850	0.9854	0.0324	0.9263	1.0551	49.2	51.0
Incomb CRM+High ex. BB	4.5	0.0006180371	25	0.9993	0.9993	0.0012	0.9971	1.0016	0.9809	0.9822	0.0305	0.9273	1.0438	47.5	52.3
Incomb CRM+Low inc. BB	3.5	0.0004854631	25	0.9994	0.9994	0.0013	0.9968	1.0020	0.9853	0.9856	0.0338	0.9186	1.0548	49.0	51.0
Incomb CRM+High inc. BB	4.6	0.0006365027	25	0.9992	0.9993	0.0012	0.9968	1.0017	0.9788	0.9812	0.0328	0.9145	1.0446	47.9	51.8
Project alone CRM+Low	2.5	0.0003404688	35	0.9996	0.9996	0.0010	0.9975	1.0016	0.9844	0.9861	0.0385	0.9141	1.0650	48.5	50.9
Project alone CRM+High	3.3	0.0004546042	35	0.9995	0.9995	0.0011	0.9975	1.0016	0.9807	0.9812	0.0385	0.9071	1.0582	48.5	51.3
Incomb CRM+Low ex. BB	3.4	0.0004730786	35	0.9994	0.9994	0.0010	0.9975	1.0016	0.9781	0.9794	0.0378	0.9099	1.0590	48.8	51.7
Incomb CRM+High ex. BB	4.5	0.0006180371	35	0.9993	0.9993	0.0010	0.9973	1.0013	0.9741	0.9749	0.0364	0.9021	1.0512	48.4	51.6
Incomb CRM+Low inc. BB	3.5	0.0004854631	35	0.9994	0.9994	0.0011	0.9974	1.0015	0.9786	0.9802	0.0388	0.9056	1.0597	48.5	51.0
Incomb CRM+High inc. BB	4.6	0.0006365027	35	0.9992	0.9992	0.0010	0.9972	1.0013	0.9722	0.9733	0.0376	0.9027	1.0456	48.5	52.0
Project alone CRM+Low	2.5	0.0003404688	50	0.9997	0.9997	0.0009	0.9980	1.0017	0.9835	0.9857	0.0471	0.8969	1.0863	47.7	51.3
Project alone CRM+High	3.3	0.0004546042	50	0.9996	0.9996	0.0009	0.9978	1.0014	0.9790	0.9809	0.0460	0.8922	1.0745	48.7	51.6
Incomb CRM+Low ex. BB	3.4	0.0004730786	50	0.9995	0.9996	0.0009	0.9979	1.0014	0.9759	0.9785	0.0459	0.8953	1.0770	47.6	51.5
Incomb CRM+High ex. BB	4.5	0.0006180371	50	0.9995	0.9995	0.0009	0.9978	1.0013	0.9724	0.9752	0.0453	0.8898	1.0714	47.3	52.5
Incomb CRM+Low inc. BB	3.5	0.0004854631	50	0.9996	0.9996	0.0009	0.9978	1.0014	0.9799	0.9801	0.0473	0.8904	1.0749	49.5	50.7
Incomb CRM+High inc. BB	4.6	0.0006365027	50	0.9995	0.9995	0.0009	0.9977	1.0011	0.9717	0.9728	0.0453	0.8868	1.0588	47.6	51.9

369. The C-PGR for Project alone impacts after 35 years for the highest impact scenario of high displacement and WCS collision was 0.9995 (95% c.i. 0.9975-1.0016) (**Table 6-29**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.05%. This very small change indicates that the PVA trajectories with Project-alone impacts are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the kittiwake population will be of a similar size after 35 years, in the presence of Project impacts, as would be expected in the absence of Project impacts.

370. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9992 (95% c.i. 0.9972-1.0013) (**Table 6-29**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.08%. This very small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the kittiwake population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Note, the Project contributed a mortality of 3.3 birds per annum to the in-combination total of 4.5 birds per annum (including Berwick Bank impacts, worst case scenario).

371. The kittiwake population at this SPA is well below the citation population size and feature condition is Unfavourable Declining, when last assessed in June 2023. Population size at this colony decreased by 65% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). However, counts at Cape Wrath SPA in 2023 found a very substantial increase, of 191% in kittiwake AONs, at this site. The most recent count found 1,145 AONs, although this is still far below the citation population size of 9,700 pairs (NatureScot Sitelink SPA Citation[28]).

372. Given the very small predicted reduction in population growth rate in the presence of Project alone and in-combination impacts and evidence that this population has recently increased, Project alone and in-combination mortality will not prevent or reduce the potential for this population to recover.

373. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the Cape Wrath SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.4.5.2 Guillemot

374. Predicted guillemot displacement mortality, by season, and change to annual adult survival rate apportioned to the Buchan Ness to Collieston Coast SPA population is presented in **Table 6-30**. NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts (letter from NatureScot to the Project, dated 3 June 2024). However, Berwick Bank Wind

[28] SiteLink - Cape Wrath SPA (nature.scot)

Farm did not have connectivity with any of the SPAs with guillemot features, potentially impacted by the Project and so the in-combination assessment does not include any Berwick Bank impacts.

375. Note, almost all breeding season Project alone guillemot mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-30. Estimated adult guillemot Project alone and in-combination displacement seasonal and annual mortalities apportioned to the Cape Wrath SPA and change in baseline annual adult survival rate.

See ***Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts*** *for more details on calculation of mortalities and changes to survival rate.*

GUILLEMOT	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.01	0.01
Mortality - Non-breeding season (NatureScot)	1.45	4.36
Mortality - Non-breeding season (BDMPS)	1.46	4.37
Annual Project alone mortality* (displacement)	1.46	4.37
Percentage point change in annual adult survival rate	<0.01%	0.01%
Annual in-combination mortality	18.30	54.73
Percentage point change in annual adult survival rate	0.04%	0.11%

** Sum of displacement mortality for NatureScot breeding and non-breeding season. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

376. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

377. Change in adult survival rate due to in-combination impacts did exceed 0.02% and as Project alone mortality was less more 0.2 birds per annum, a PVA was required to assess in-combination impacts.

378. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

379. **Table 6-31** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the guillemot population at Cape Wrath SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the

Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

380. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population

Table 6-31. Cape Wrath SPA: Guillemot PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	1.5	0.000029	25	1.0000	1.0000	0.0003	0.9995	1.0006	0.9993	0.9995	0.0075	0.9854	1.0153	49.9	50.1
Project alone High	4.4	0.000086	25	0.9999	0.9999	0.0003	0.9994	1.0005	0.9978	0.9978	0.0072	0.9838	1.0120	49.7	50.5
Incomb Low	18.3	0.000358	25	0.9996	0.9996	0.0003	0.9991	1.0001	0.9901	0.9902	0.0071	0.9760	1.0033	48.2	52.3
Incomb High	54.7	0.001072	25	0.9988	0.9988	0.0003	0.9983	0.9993	0.9697	0.9698	0.0068	0.9564	0.9828	43.6	56.9
Project alone Low	1.5	0.000029	35	1.0000	1.0000	0.0002	0.9995	1.0004	0.9988	0.9991	0.0085	0.9826	1.0160	49.7	50.1
Project alone High	4.4	0.000086	35	0.9999	0.9999	0.0002	0.9995	1.0003	0.9969	0.9968	0.0082	0.9801	1.0127	49.7	51.2
Incomb Low	18.3	0.000358	35	0.9996	0.9996	0.0002	0.9992	1.0000	0.9861	0.9861	0.0078	0.9707	1.0016	47.7	53.4
Incomb High	54.7	0.001072	35	0.9988	0.9988	0.0002	0.9984	0.9992	0.9582	0.9583	0.0077	0.9432	0.9729	42.5	58.7
Project alone Low	1.5	0.000029	50	1.0000	1.0000	0.0002	0.9996	1.0004	0.9991	0.9992	0.0093	0.9810	1.0179	49.9	50.1
Project alone High	4.4	0.000086	50	0.9999	0.9999	0.0002	0.9996	1.0003	0.9970	0.9969	0.0090	0.9791	1.0144	49.9	50.2
Incomb Low	18.3	0.000358	50	0.9997	0.9997	0.0002	0.9994	1.0001	0.9860	0.9862	0.0087	0.9700	1.0038	48.4	51.9
Incomb High	54.7	0.001072	50	0.9992	0.9992	0.0002	0.9988	0.9995	0.9578	0.9581	0.0087	0.9421	0.9750	42.5	56.9

381. Predicted Project alone impacts on the guillemot population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

382. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement was 0.9988 (95% c.i. 0.9984-0.9992) (**Table 6-31**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.12%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the guillemot population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Note, the Project contributed a mortality of only 4.4 birds per annum to the in-combination total of 54.7 birds per annum (worst case scenario).

383. The guillemot population at this SPA is above the citation population size and feature condition is Favourable Maintained. Population size at this colony decreased slightly between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023) although population size remained well above the citation population size, of 13,700 individuals. Guillemot populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). However, the Cape Wrath SPA guillemot population increased by 64% between the Seabirds Count estimate and the 2023 colony count (Tremlett *et al.*, 2024).

384. The Cape Wrath SPA guillemot population is in Favourable Maintained condition and has recently increased. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be maintained.

385. Consequently, a conclusion of no AEoSI was reached for the guillemot feature of the Cape Wrath SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.4.5.3 Razorbill

386. Predicted razorbill displacement mortality, by season, and change to annual adult survival rate apportioned to the Cape Wrath SPA population is presented in **Table 6-32.**

387. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-32. Estimated adult razorbill Project alone and in-combination displacement seasonal and annual mortalities apportioned to the Cape Wrath SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

RAZORBILL	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.38	0.50
Mortality - Non-breeding season (NatureScot)	0.00	0.00
Mortality - Autumn migration (BDMPS)	0.00	0.00
Mortality - Winter (BDMPS)	0.00	0.00
Mortality - Spring migration (BDMPS)	0.00	0.00
Annual Project alone mortality* (displacement)	0.38	0.50
Percentage point change in annual adult survival rate	0.01%	0.01%
Annual in-combination mortality excl Berwick Bank	0.88	1.85
Percentage point change in annual adult survival rate	0.02%	0.04%
Annual in-combination mortality incl Berwick Bank	0.91	1.94
Percentage point change in annual adult survival rate	0.02%	0.04%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

388. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

389. Change in adult survival rate due to in-combination impacts exceeded the 0.02% threshold and as Project alone mortality was more than 0.5 birds per annum, a PVA was required to assess in-combination impacts.

390. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts

391. **Table 6-33** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the razorbill population at Cape Wrath SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA**

population scales for Project alone and in-combination impacts includes information on all inputs to this PVA and a plot showing population size over time.

392. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-33. Cape Wrath SPA: Razorbill PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	0.4	0.00008676104	25	0.9998	0.9999	0.0019	0.9960	1.0036	0.9965	0.9975	0.0494	0.9032	1.0963	50.1	49.8
Project alone High	0.5	0.00011572468	25	0.9998	0.9999	0.0019	0.9961	1.0038	0.9948	0.9974	0.0509	0.9048	1.1011	50.3	49.9
Incomb Low ex. BB	0.9	0.00020221977	25	0.9997	0.9997	0.0019	0.9960	1.0034	0.9921	0.9944	0.0495	0.8984	1.0914	49.8	50.4
Incomb High ex. BB	1.9	0.00042607532	25	0.9996	0.9996	0.0018	0.9961	1.0031	0.9901	0.9894	0.0466	0.9013	1.0810	48.3	52.1
Incomb Low inc. BB	0.9	0.00020891870	25	0.9998	0.9998	0.0019	0.9961	1.0035	0.9940	0.9952	0.0495	0.9028	1.0907	49.9	50.3
Incomb High inc. BB	1.9	0.00044661168	25	0.9994	0.9994	0.0018	0.9959	1.0030	0.9831	0.9862	0.0480	0.8937	1.0835	49.2	52.0
Project alone Low	0.4	0.00008676104	35	0.9998	0.9999	0.0018	0.9962	1.0036	0.9953	0.9974	0.0661	0.8762	1.1469	49.4	50.5
Project alone High	0.5	0.00011572468	35	0.9997	0.9998	0.0018	0.9963	1.0036	0.9885	0.9956	0.0657	0.8757	1.1342	48.7	51.6
Incomb Low ex. BB	0.9	0.00020221977	35	0.9997	0.9997	0.0018	0.9962	1.0035	0.9917	0.9928	0.0644	0.8717	1.1318	48.8	51.1
Incomb High ex. BB	1.9	0.00042607532	35	0.9995	0.9995	0.0018	0.9959	1.0033	0.9827	0.9850	0.0654	0.8651	1.1257	48.5	53.0
Incomb Low inc. BB	0.9	0.00020891870	35	0.9997	0.9998	0.0018	0.9961	1.0034	0.9898	0.9935	0.0661	0.8681	1.1270	48.3	51.6
Incomb High inc. BB	1.9	0.00044661168	35	0.9995	0.9994	0.0018	0.9959	1.0029	0.9813	0.9822	0.0634	0.8628	1.1110	46.8	53.4
Project alone Low	0.4	0.00008676104	50	0.9999	0.9999	0.0018	0.9964	1.0037	0.9914	0.9997	0.0954	0.8317	1.1955	49.9	50.2
Project alone High	0.5	0.00011572468	50	0.9999	0.9999	0.0018	0.9966	1.0036	0.9906	0.9967	0.0928	0.8341	1.1977	49.4	51.8
Incomb Low ex. BB	0.9	0.00020221977	50	0.9998	0.9998	0.0018	0.9965	1.0035	0.9895	0.9953	0.0922	0.8313	1.1866	48.6	52.1
Incomb High ex. BB	1.9	0.00042607532	50	0.9997	0.9996	0.0019	0.9958	1.0034	0.9824	0.9859	0.0956	0.8103	1.1852	48.2	52.2
Incomb Low inc. BB	0.9	0.00020891870	50	0.9997	0.9998	0.0018	0.9964	1.0035	0.9849	0.9932	0.0925	0.8277	1.1935	49.4	50.9
Incomb High inc. BB	1.9	0.00044661168	50	0.9996	0.9996	0.0018	0.9962	1.0031	0.9778	0.9838	0.0913	0.8249	1.1713	48.2	52.1

393. Predicted Project alone impacts on the razorbill population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

394. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, including Berwick Bank impacts, was 0.9994 (95% c.i. 0.9959-1.0029 (**Table 6-33**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.06%. This very small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the razorbill population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Note, the Project contributed a mortality of < 1 bird per annum to the in-combination total of 2 per annum (including Berwick Bank impacts, worst case scenario).

395. Razorbill feature condition at this SPA is Favourable Maintained, when last assessed in June 2023. Razorbill populations are thought to have not been heavily impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). No razorbill colonies were counted in 2023 for the purpose of assessing HPAI impacts (Tremlett *et al.*, 2024).

396. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any future declines and to not prevent or reduce the potential for this population to be maintained.

397. Consequently, a conclusion of no AEoSI was reached for the razorbill feature at Cape Wrath SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.4.5.4 Puffin

398. Predicted puffin displacement mortality, by season, and change to annual adult survival rate apportioned to the Cape Wrath SPA population is presented in **Table 6-34**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

399. All breeding season puffin mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning no breeding season mortality was apportioned to this SPA.

400. Non-breeding season apportioning weighting for each SPA was based on the relative contribution each SPA made to the UK North Sea BDMPS population in each season (see **Appendix 5 - HRA: Apportioning Technical Report**). Cape Wrath SPA made no contribution to the puffin BDMPS non-breeding season population (Furness, 2015). Consequently, both breeding and non-breeding season Project alone puffin mortality was zero.

Table 6-34. Estimated adult puffin Project alone and in-combination displacement seasonal and annual mortalities apportioned to the Cape Wrath SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

PUFFIN	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (BDMPS)	0.00	0.00
Annual Project alone mortality (displacement)	0.00	0.00
Percentage point change in annual adult survival rate	0.00%	0.00%
Annual in-combination incl Berwick Bank	1.34	2.23
Percentage point change in annual adult survival rate	0.03%	0.05%
Annual in-combination excl Berwick Bank	1.33	2.23
Percentage point change in annual adult survival rate	0.03%	0.05%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

401. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

402. Change in adult survival rate due to in-combination impacts did exceed 0.02%, but as Project alone mortality was less than 0.2 birds per annum, no PVA was required to assess in-combination impacts.

403. Puffin mortality from the Project alone was zero in both the breeding and non-breeding season. Consequently, a conclusion of no AEoSI was reached for the puffin feature at Cape Wrath SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.4.5.5 Fulmar

404. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the Cape Wrath SPA population is presented in **Table 6-35**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features.

Table 6-35. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities apportioned to the Cape Wrath SPA and change in baseline annual adult survival rate

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.062	0.186
Mortality - Non-breeding season (NatureScot)	0.000	0.001
Mortality - Autumn migration (BDMPS)	0.000	0.000
Mortality - Winter (BDMPS)	0.000	0.001
Mortality - Spring migration (BDMPS)	0.000	0.000
Annual Project alone mortality* (displacement)	0.062	0.187
Percentage point change in annual adult survival rate	0.002%	0.006%

** Sum of displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

405. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required.

406. The fulmar population at this SPA is well below the citation population size and feature condition is Unfavourable Declining, when last assessed in June 2023. Population size at this colony decreased by 52% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmars were undertaken in 2023 (Tremlett *et al.*, 2024).

407. Whilst this feature has undergone a decline and is in Unfavourable Declining condition, the very small predicted mortality from Project alone impacts on this population will not prevent or reduce the potential for this population to recover.

408. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the Cape Wrath SPA, from displacement and barrier impacts from the Project alone. No in-combination assessment was undertaken for fulmar.

6.3.4.6 Conclusions

409. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Cape Wrath SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

410. A conclusion of **no AEoSI** was reached for the **guillemot** feature of the **Cape Wrath SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

411. A conclusion of **no AEoSI** was reached for the **razorbill** feature of the **Cape Wrath SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

412. A conclusion of **no AEoSI** was reached for the **puffin** feature of the **Cape Wrath SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

413. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Cape Wrath SPA**, from displacement impacts from the **Project alone**.

414. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, guillemot, razorbill, puffin and fulmar, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Cape Wrath SPA**.

415. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Cape Wrath SPA** was reached.

6.3.5 Copinsay SPA

6.3.5.1 *Site Description*

416. The Copinsay SPA was classified on 29 March 1994, with marine extension classified on 25 September 2009 due to populations of breeding seabirds. The site is in eastern Orkney and is approximately 67 km south-east of the Project on the opposite side of Orkney.

417. The Copinsay SPA comprises a group of islands 4 km off the east coast of Orkney Mainland. The islands have a cliffed rocky coastline and maritime vegetation that support large colonies of breeding seabirds.

418. 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.

6.3.5.2 *Conservation Objectives for the SPA*

419. The conservation objectives of the Copinsay SPA are to:

- 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
- 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.

6.3.5.3 *Qualifying features*

420. The qualifying features of the SPA are presented below in **Table 6-36**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

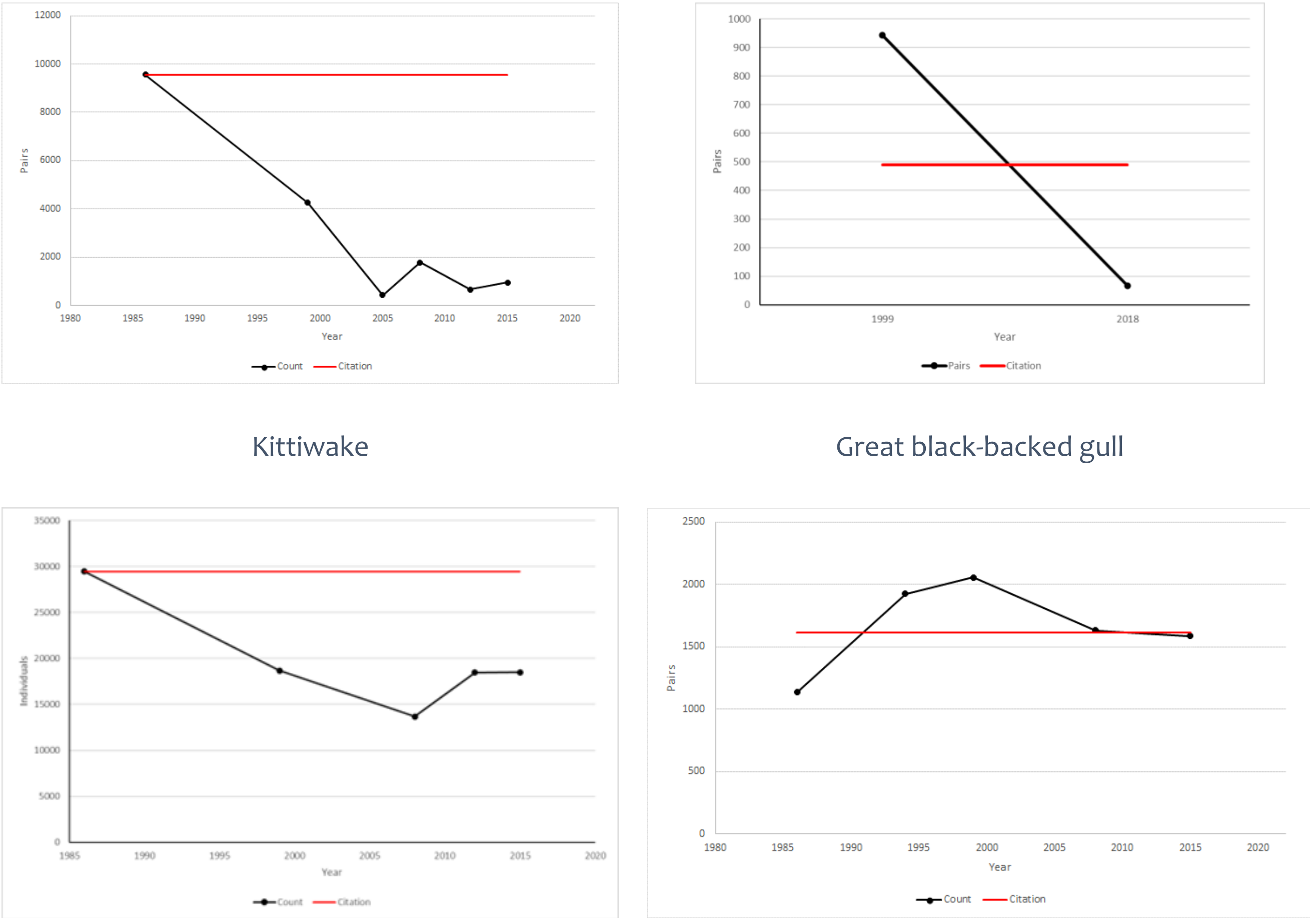
Table 6-36. Qualifying interests and condition for the Copinsay SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake* (breeding)	9,550 pairs, 2% of the GB population	955 pairs	Unfavourable Declining	1 June 2023	Red

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Great black-backed gull* (breeding)	490 pairs, 3% of the GB population	67 pairs	Unfavourable Declining	1 June 2023	Amber
Guillemot* (breeding)	29,450 individuals, 3% of the GB population	18,479 individuals	Unfavourable Declining	1 June 2023	Amber
Fulmar* (breeding)	1,615 pairs, 0.3% of the GB population	1,618 pairs	Favourable Maintained	1 June 2023	Amber
Seabird assemblage (breeding)	Regularly supports 70,000 seabirds including nationally important populations	n/a	Unfavourable No change	11 June 2015	n/a

421. Copinsay SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 70,000 seabirds including nationally important populations of the following species: black-legged kittiwake, common guillemot, great black-backed gull and Northern fulmar.

422. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) count data was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-7**).



Guillemot

Fulmar

Figure 6-7. Copinsay SPA qualifying feature population trends from 1990 - 2015 (citation population size shown by red line).

6.3.5.4 *Potential for the Project to impact the site's Conservation Objectives*

423. The Copinsay SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Collision impacts from the offshore Project during operation on the **great black-backed gull** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **guillemot** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

424. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

425. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

426. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.5.5 *Assessment of predicted impacts for Project alone and in-combination*

427. An in-combination assessment was undertaken that collated quantitative information on impacts to features of this SPA from published consent applications. Note that no other OWFs have been required to undertake a quantitative assessment of fulmar displacement/barrier impacts and so an in-combination assessment was not possible for this species.

428. Other reasonably foreseeable projects which have not yet submitted an application may also impact some of the qualifying features of this site. MD-LOT advised (by email, 10 June 2024) that a qualitative assessment of OWF projects for which a Scoping Opinion has been adopted should be undertaken.

429. OWF projects for which a Scoping Opinion has been adopted and which identified possible impacts from their project on the Copinsay SPA, in their Scoping Reports, are listed in **Table 6-37**.

Table 6-37 In-combination project with the potential to impact the Copinsay SPA that have not yet submitted an application.

SPA qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Black-legged kittiwake						Y
Common guillemot						Y
Great black-backed gull						Y
Northern fulmar						Y

430. The predicted impacts from these projects have not been considered in the quantitative assessment of the impacts from the Project in-combination with other reasonably foreseeable projects, as it is assumed that these projects will need to consider this Project in their in-combination assessments.

6.3.5.5.1 Kittiwake

431. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Copinsay SPA population is presented in **Table 6-38**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with

Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-38. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities apportioned to the Copinsay SPA and change in baseline annual adult survival rate.

***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.07	0.01	0.07	0.04
Mortality - Non-breeding season (NatureScot)	0.04	0.01	0.04	0.02
Mortality - Autumn migration (BDMPS)	0.02	0.00	0.02	0.01
Mortality - Spring migration (BDMPS)	0.03	0.01	0.03	0.01
Annual Project alone mortality* (collision + displacement)	0.13		0.18	
Percentage point change in annual adult survival rate	0.01%		0.01%	
Annual in-combination mortality excl Berwick Bank	2.21		2.46	
Percentage point change in annual adult survival rate	0.12%		0.13%	
Annual in-combination mortality incl Berwick Bank	2.71		3.18	
Percentage point change in annual adult survival rate	0.14%		0.17%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

432. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

433. Change in adult survival rate due to in-combination impacts did exceed 0.02%, but as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

434. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be maintained.

435. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the Copinsay SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.5.5.2 Great black-backed gull

436. Predicted great black-backed collision mortality, by season, and change to annual adult survival rate apportioned to the Copinsay SPA population is presented in **Table 6-39**. NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts (letter from NatureScot to the Project, dated 3 June 2024). Berwick Bank Wind Farm did not undertake a quantitative assessment for great black-backed gull because this species was rarely seen within their offshore development area. Therefore, only one set of in-combination impacts are presented.

Table 6-39. Estimated adult great black-backed gull Project alone and in-combination collision seasonal and annual mortalities apportioned to the Copinsay SPA and change in baseline annual adult survival rate.
***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

GREAT BLACK-BACKED GULL	Collision (WCS)
Mortality - Breeding season (NatureScot)	0.02
Mortality - Non-breeding season (NatureScot)	0.05
Mortality - Non-breeding season (BDMPS)	0.05
Annual Project alone mortality* (collision)	0.07
Percentage point change in annual adult survival rate	0.06%
Annual in-combination mortality	4.35
Percentage point change in annual adult survival rate	3.24%

** Sum of collision mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

437. As change in adult survival rate from the Project alone impacts exceeded the 0.02% threshold, a PVA was required for Project alone impacts.

438. Change in adult survival rate due to in-combination impacts did exceed 0.02%, but as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

439. **Table 6-40** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the great black-backed population at Copinsay SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

440. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are

sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-40. Copinsay SPA: Great black-backed gull PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM	0.1	0.0005501637	25	0.9993	0.9993	0.0028	0.9935	1.0052	0.9854	0.9892	0.0771	0.8446	1.1473	48.2	51.5
Project alone CRM	0.1	0.0005501637	35	0.9994	0.9994	0.0020	0.9954	1.0034	0.9824	0.9837	0.0765	0.8477	1.1449	48.2	51.6
Project alone CRM	0.1	0.0005501637	50	0.9996	0.9995	0.0014	0.9967	1.0025	0.9809	0.9835	0.0767	0.8429	1.1441	47.5	52.0

441. The C-PGR for Project alone impacts after 35 years for the highest impact scenario of WCS collision was 0.9994 (95% c.i. 0.9954-1.0034) (**Table 6-40**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.06%. This very small change indicates that the PVA trajectories with Project-alone impacts are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the great black-backed gull population will be of a similar size after 35 years, in the presence of Project impacts, as would be expected in the absence of Project impacts.

442. A PVA was not required to further assess in-combination impacts due to Project alone mortality being <0.2 birds per annum.

443. The great black-backed gull population at this SPA is well below the citation population size and feature condition was Unfavourable Declining, when last assessed in June 2023. Population size at this colony decreased by 93% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023).

444. Great black-backed gull populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). This colony had undergone a further decline when counted in 2023 with a count of just 49 pairs (Tremlett *et al.*, 2024).

445. The great black-backed gull feature of Copinsay SPA has substantially declined since citation and has undergone a further decline recently due to HPAI impacts. However, the Project alone and in-combination impacts on this population were very small with a predicted worst case mortality of just 0.07 birds per annum (equivalent to 1 bird every 14 years). The Project alone and in-combination impacts on this population are sufficiently small to not exacerbate any further declines and to not prevent or reduce the potential for this population to be restored.

446. Consequently, a conclusion of no AEoSI was reached for the great black-backed gull feature of the Copinsay SPA, from collision impacts from the Project alone and in-combination with other OWFs.

6.3.5.5.3 Guillemot

447. Predicted guillemot displacement mortality, by season, and change to annual adult survival rate apportioned to the Copinsay SPA population is presented in **Table 6-41**. NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts (letter from NatureScot to the Project, dated 3 June 2024). However, Berwick Bank Wind Farm did not have connectivity with any of the SPAs with guillemot features, potentially impacted by the Project and so the in-combination assessment does not include any Berwick Bank impacts.

448. Note, almost all breeding season Project alone guillemot mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-41. Estimated adult guillemot Project alone and in-combination displacement seasonal and annual mortalities apportioned to the Copinsay SPA and change in baseline annual adult survival rate.

***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

GUILLEMOT	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.71	2.12
Mortality - Non-breeding season (BDMPS)	0.71	2.12
Annual Project alone mortality* (displacement)	0.71	2.12
Percentage point change in annual adult survival rate	<0.01%	0.01%
Annual in-combination mortality	29.44	80.81
Percentage point change in annual adult survival rate	0.12%	0.33%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

449. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

450. Change in adult survival rate due to in-combination impacts exceeded the 0.02% threshold and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

451. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

452. **Table 6-42** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the guillemot population at Copinsay SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

453. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population

size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-42. Copinsay SPA: Guillemot PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	0.7	0.000028	25	1.0000	1.0000	0.0004	0.9992	1.0007	0.9994	0.9994	0.0100	0.9783	1.0195	49.7	50.5
Project alone High	2.1	0.000085	25	0.9999	0.9999	0.0004	0.9991	1.0007	0.9973	0.9977	0.0106	0.9769	1.0182	49.0	50.4
Incomb Low	29.4	0.001189	25	0.9987	0.9987	0.0004	0.9979	0.9994	0.9665	0.9665	0.0099	0.9473	0.9849	43.2	57.4
Incomb High	80.8	0.003264	25	0.9964	0.9964	0.0004	0.9956	0.9972	0.9102	0.9103	0.0097	0.8913	0.9293	29.6	70.3
Project alone Low	0.7	0.000028	35	1.0000	1.0000	0.0003	0.9994	1.0005	0.9990	0.9990	0.0114	0.9777	1.0204	49.8	50.6
Project alone High	2.1	0.000085	35	0.9999	0.9999	0.0003	0.9993	1.0006	0.9968	0.9969	0.0121	0.9731	1.0196	49.8	51.4
Incomb Low	29.4	0.001189	35	0.9987	0.9987	0.0003	0.9981	0.9993	0.9541	0.9542	0.0111	0.9327	0.9754	41.2	59.2
Incomb High	80.8	0.003264	35	0.9964	0.9964	0.0003	0.9957	0.9970	0.8774	0.8776	0.0106	0.8559	0.8984	25.5	74.1
Project alone Low	0.7	0.000028	50	1.0000	1.0000	0.0003	0.9995	1.0005	0.9984	0.9992	0.0129	0.9735	1.0239	49.6	50.6
Project alone High	2.1	0.000085	50	0.9999	0.9999	0.0002	0.9995	1.0004	0.9974	0.9971	0.0131	0.9714	1.0223	49.0	50.9
Incomb Low	29.4	0.001189	50	0.9991	0.9991	0.0003	0.9986	0.9996	0.9537	0.9540	0.0125	0.9304	0.9776	41.0	58.1
Incomb High	80.8	0.003264	50	0.9974	0.9974	0.0003	0.9969	0.9979	0.8765	0.8771	0.0117	0.8548	0.9006	28.8	71.6

454. Predicted Project alone impacts on the guillemot population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

455. The C-PGR for the Project in-combination with other OWFs after 35 years, for the highest impact scenario of WCS collision, was 0.9964 (95% c.i. 0.9957-0.9970) (**Table 6-42**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.36%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the guillemot population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Note, the Project contributed a mortality of only 2.1 birds per annum to the in-combination total of 81 birds per annum (worst case scenario).

456. The guillemot population at this SPA is below the citation population size and feature condition was Unfavourable Declining, when last assessed in June 2023. Population size at this colony remained stable between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023) but a more recent count, in 2023, found a 56% reduction in population size, compared with the Seabirds Count estimate (Tremlett *et al.*, 2024). Guillemot populations are known to have been impacted by the HPAI epidemic in 2021 and 2022, and evidence suggests that the Copinsay SPA guillemot population has been impacted (Tremlett *et al.*, 2024).

457. Whilst the guillemot population at Copinsay SPA has undergone recent declines, the Project alone and in-combination impacts on this population are predicted to be very small. They are sufficiently small to not further exacerbate any declines and will not prevent or reduce the potential for this population to recover.

458. Consequently, a conclusion of no AEoSI was reached for the guillemot feature of the Copinsay SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.5.5.4 Fulmar

459. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the Copinsay SPA population is presented in **Table 6-43**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features.

Table 6-43. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities apportioned to the Copinsay SPA and change in baseline annual adult survival rate

***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.011	0.032
Mortality - Non-breeding season (NatureScot)	0.039	0.117
Mortality - Autumn migration (BDMPS)	0.015	0.045
Mortality - Winter (BDMPS)	0.007	0.020
Mortality - Spring migration (BDMPS)	0.018	0.053
Annual Project alone mortality* (displacement)	0.050	0.149
Percentage point change in annual adult survival rate	0.002%	0.005%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

460. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination assessment was undertaken for fulmar.

461. Fulmar feature condition is Favourable Maintained, when last assessed in June 2023. There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmars were undertaken in 2023 (Tremlett *et al.*, 2024).

462. The very small predicted mortality from Project impacts on this population will not prevent or reduce the potential for this feature to be maintained.

463. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the Copinsay SPA, from displacement and barrier impacts from the Project alone. No in-combination assessment was undertaken for fulmar.

6.3.5.6 Conclusions

464. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Copinsay SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

465. A conclusion of **no AEoSI** was reached for the **great black-backed gull** feature of the **Copinsay SPA**, from collision impacts from the **Project alone** and **in-combination** with other OWFs.

466. A conclusion of **no AEoSI** was reached for the **guillemot** feature of the **Copinsay SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

467. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Copinsay SPA**, from displacement impacts from the **Project alone**.

468. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, great black-backed gull, guillemot and fulmar, for which a conclusion of no AEoSI was

reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Copinsay SPA**.

6.3.6 Coquet Island SPA

6.3.6.1 Site description

469. Coquet Island is a small uninhabited island which lies less than a mile off the coast of Northumberland, near Amble, in the north east of England. The site is approximately 415 km south-east of the Project. The island is managed by the RSPB and consists of a flat grassy plateau, surrounded by low sandstone cliffs and intertidal boulders and rock. The total area of the island at mean low water is 22 ha.

470. The island is surrounded by the Northumberland Marine SPA, which protects the foraging areas for the tern species and the breeding seabird assemblage. The Coquet to St Mary's MCZ, designated for subtidal and intertidal benthic habitats, also surrounds the island. The site shares features with the nearby Northumbria Coast SPA, Lindisfarne SPA and the Farne Islands SPA.

471. The Northumberland coast and surrounding sea supports important breeding colonies of seabirds and auks, protected at four existing SPAs: Farne Islands SPA, Coquet Island SPA, Lindisfarne SPA and Northumbria Coast SPA. The surrounding waters are protected by Northumberland Marine SPA, these areas are used by the seabirds and auks for foraging and maintenance activities, such as bathing and preening.

6.3.6.2 Conservation Objectives for the SPA

472. The conservation objectives of the Coquet Island SPA are:

> To ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:
>
> - the extent and distribution of the habitats of the qualifying features;
> - the structure and function of the habitats of the qualifying features;
> - the supporting processes on which the habitats of the qualifying features rely;
> - the populations of each of the qualifying features;
> - the distribution of qualifying features within the site.

6.3.6.3 Qualifying features

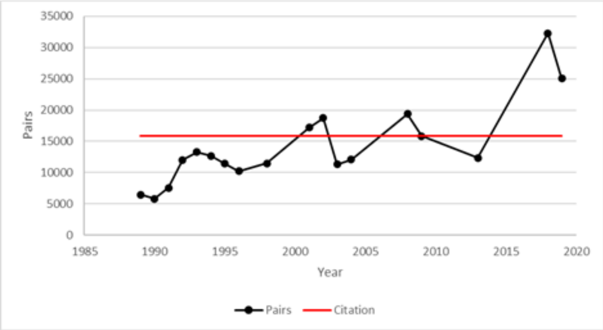
473. The qualifying features of the SPA are presented below in **Table 6-44**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

Table 6-44. Qualifying interests and condition for the Coquet Island SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Arctic tern	1,230 pairs 2,460 individuals (2010-2014) 2.32% of GB population	1,240 pairs	Not available	n/a	Amber
Common tern	1,189 pairs 2,378 individuals (2010-2014). 11.89% of GB population	1,667 pairs	Not available	n/a	Amber
Roseate tern	80 pairs 160 individuals (2010-2014) 93.02% of GB population	n/a	Not available	n/a	Red
Sandwich tern	1,300 pairs 2,600 individuals (2010-2014)	1,415 pairs	Not available	n/a	Amber
Atlantic puffin*	31,686 breeding adult individuals	25,029 pairs	Not available	n/a	Amber
Black-headed gull*	7,772 breeding adults	5,564 pairs	Not available	n/a	Red
Seabird assemblage	During the breeding season (2010-2014), the site supports 47,662 individual seabirds	n/a	Not available	n/a	n/a

474. Coquet Island SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 47,000 seabirds including nationally important populations of the following species: Atlantic puffin, black-headed gull, Arctic tern, common tern, roseate tern and Sandwich tern.

475. For the qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) count data between 1986 and 2023 was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-8**).



Puffin

Figure 6-8. Coquet Island SPA qualifying feature population trends from 1986 - 2023 (citation population size shown by red line).

6.3.6.4 *Potential for the Project to impact the site's conservation objectives*

476. The Coquet Island SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **puffin** qualifying feature, during the non-breeding season;
- Displacement impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the non-breeding season.

477. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

478. These predicted impacts have the potential to undermine the conservation objective:

- To ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring the populations of each of the qualifying features.

479. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.6.5 *Assessment of predicted impacts for Project alone and in-combination*

6.3.6.5.1 Puffin

480. Predicted puffin displacement mortality, by season, and change to annual adult survival rate apportioned to the Coquet Island SPA population is presented in **Table 6-45**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

481. Note, almost all breeding season Project alone puffin mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-45. Estimated adult puffin Project alone and in-combination displacement seasonal and annual mortalities apportioned to the Coquet Island SPA and change in baseline annual adult survival rate.

***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

PUFFIN	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.68	2.05
Mortality - Non-breeding season (BDMPS)	0.68	2.05
Annual Project alone mortality (displacement)*	0.68	2.05
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination excl Berwick Bank	21.37	46.62
Percentage point change in annual adult survival rate	0.043%	0.093%
Annual in-combination incl Berwick Bank	28.46	62.22
Percentage point change in annual adult survival rate	0.057%	0.12%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

482. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

483. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

484. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

485. **Table 6-46** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the puffin population at Coquet Island SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

486. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-46. Coquet Island SPA: Puffin PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	0.7	0.00001362408	25	1.0000	1.0000	0.0006	0.9988	1.0011	0.9992	0.9994	0.0156	0.9690	1.0306	49.7	50.3
Project alone High	2.0	0.00004087223	25	0.9999	0.9999	0.0006	0.9988	1.0011	0.9985	0.9984	0.0161	0.9669	1.0304	49.1	50.8
Incomb Low ex. BB	21.4	0.00042686323	25	0.9995	0.9995	0.0006	0.9984	1.0008	0.9869	0.9873	0.0158	0.9557	1.0196	48.2	51.6
Incomb High ex. BB	46.6	0.00093121082	25	0.9989	0.9989	0.0006	0.9977	1.0001	0.9723	0.9719	0.0159	0.9407	1.0033	47.3	52.7
Incomb Low inc. BB	28.5	0.00056850719	25	0.9993	0.9993	0.0006	0.9982	1.0005	0.9826	0.9827	0.0157	0.9522	1.0141	47.7	51.5
Incomb High inc. BB	62.2	0.00124290891	25	0.9985	0.9985	0.0006	0.9973	0.9997	0.9628	0.9625	0.0153	0.9316	0.9939	46.4	53.8
Project alone Low	0.7	0.00001362408	35	1.0000	1.0000	0.0006	0.9988	1.0012	0.9997	0.9997	0.0215	0.9578	1.0438	49.6	50.1
Project alone High	2.0	0.00004087223	35	0.9999	0.9999	0.0006	0.9988	1.0011	0.9984	0.9984	0.0218	0.9556	1.0425	49.4	50.4
Incomb Low ex. BB	21.4	0.00042686323	35	0.9995	0.9995	0.0006	0.9984	1.0007	0.9829	0.9836	0.0213	0.9438	1.0264	48.5	52.1
Incomb High ex. BB	46.6	0.00093121082	35	0.9989	0.9989	0.0006	0.9977	1.0001	0.9619	0.9624	0.0213	0.9195	1.0059	46.1	53.0
Incomb Low inc. BB	28.5	0.00056850719	35	0.9993	0.9994	0.0006	0.9981	1.0006	0.9768	0.9771	0.0219	0.9338	1.0208	47.9	51.9
Incomb High inc. BB	62.2	0.00124290891	35	0.9986	0.9986	0.0006	0.9974	0.9997	0.9492	0.9494	0.0205	0.9082	0.9905	45.1	53.8
Project alone Low	0.7	0.00001362408	50	1.0000	1.0000	0.0006	0.9987	1.0012	0.9975	0.9989	0.0326	0.9363	1.0677	50.3	49.6
Project alone High	2.0	0.00004087223	50	0.9999	1.0000	0.0006	0.9987	1.0011	0.9981	0.9982	0.0324	0.9368	1.0597	49.9	50.1
Incomb Low ex. BB	21.4	0.00042686323	50	0.9997	0.9997	0.0006	0.9984	1.0009	0.9824	0.9836	0.0310	0.9202	1.0488	49.0	50.5
Incomb High ex. BB	46.6	0.00093121082	50	0.9992	0.9992	0.0006	0.9979	1.0005	0.9623	0.9617	0.0307	0.8995	1.0264	47.2	52.4
Incomb Low inc. BB	28.5	0.00056850719	50	0.9995	0.9995	0.0006	0.9983	1.0009	0.9759	0.9766	0.0319	0.9166	1.0441	48.2	51.5
Incomb High inc. BB	62.2	0.00124290891	50	0.9990	0.9990	0.0006	0.9977	1.0003	0.9493	0.9499	0.0314	0.8860	1.0160	47.3	53.4

487. Predicted Project alone impacts on the puffin population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

488. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, including Berwick Bank impacts, was 0.9986 (95% c.i. 0.9974-0.9997) (**Table 6-46).** The predicted reduction in population growth rate under this highest impact worst case scenario was 0.14%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the puffin population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Additionally, the Project contributed a mortality of only 2 birds per annum to the in-combination total of 62 birds per annum (including Berwick Bank impacts, worst case scenario).

489. The puffin population at this SPA is a component of the breeding seabird assemblage feature, rather than being a qualifying feature in its own right. The feature status has not been assessed recently[29]. However, population size at this colony increased by 45% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). There is no evidence of puffin populations being impacted by the HPAI epidemic and no additional counts of puffins at Coquet Island SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

490. The Coquet Island SPA puffin population has undergone increases over the last 20 years and has not been impacted by HPAI. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any future declines that might occur and will not prevent or reduce the potential for this population to be maintained.

491. Consequently, a conclusion of no AEoSI was reached for the puffin feature of the Coquet Island SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.6.6 *Conclusions*

492. A conclusion of **no AEoSI** was reached for the **puffin** feature of the **Coquet Island SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

493. LSE was ruled out for all features of the breeding seabird assemblage, except for puffin, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Coquet Island SPA**.

494. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Coquet Island SPA** was reached.

[29] Designated Sites View (naturalengland.org.uk)

6.3.7 East Caithness Cliffs SPA

6.3.7.1 Site Description

495. The East Caithness Cliffs SPA was Classified on 27 March 1996, with a marine extension classified on 25 September 2009 due to its populations of breeding seabirds. The site is on the east coast of Caithness and Sutherland on the Moray Firth and is approximately 70 km south-east of the Project on the Scottish mainland.

496. 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.

497. The boundary of the SPA overlaps either partly or wholly with the following SSSIs: 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.

6.3.7.2 Conservation Objectives for the SPA

498. The conservation objectives of the East Caithness Cliffs SPA are:

- 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
- 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.

6.3.7.3 Qualifying features

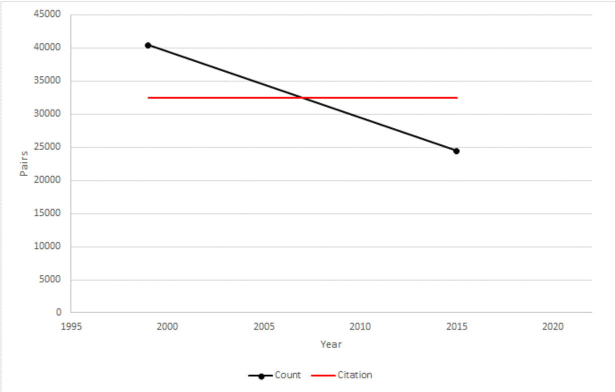
499. The qualifying features of the SPA are presented below in **Table 6-47**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury et al. (2021) in Birds of Conservation Concern 5.

Table 6-47 Qualifying interests and condition for the East Caithness Cliffs SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

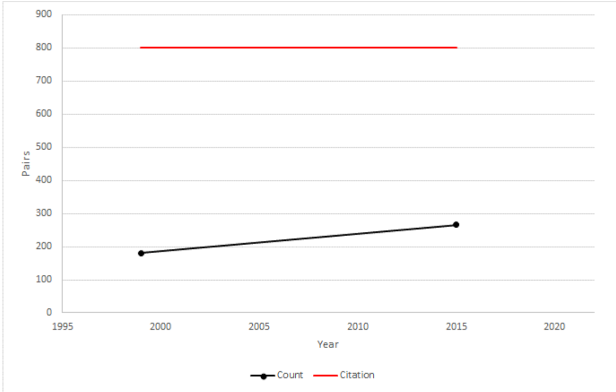
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake (breeding)	32,500 pairs, 1.0% of north Atlantic biogeographic population	24,479 pairs	Favourable Maintained	30 June 2015	Red
Great black-backed gull* (breeding)	800 pairs, 4% of the GB population	266 pairs	Unfavourable No change	30 June 2015	Amber
Herring gull (breeding)	9,400 pairs, 1.0% of NW European biogeographic population	3,300 pairs	Unfavourable No change	30 June 2015	Red
Guillemot (breeding)	106,700 individuals, 3.1% of north Atlantic biogeographic population	149,228 individuals	Favourable Maintained	30 June 2015	Amber
Razorbill (breeding)	15,800 individuals, 1.8% of total *A. t. islandica* biogeographic population	30,757 individuals	Favourable Maintained	30 June 2015	Amber
Cormorant* (breeding)	230 pairs, 3% of the GB population	70 pairs	Unfavourable Declining	30 June 2015	Green
Shag (breeding)	2,300 pairs, 1.8% of the north Europe biogeographic population	1,098 pairs	Unfavourable No change	30 June 2015	Red
Fulmar* (breeding)	15,000 pairs, 3% of the GB population	13,814 pairs	Favourable Maintained	30 June 2015	Amber
Peregrine (breeding)	estimated 6 pairs, 0.5% of the GB population and selected as one of the most suitable sites for peregrine in GB	n/a	Favourable Maintained	4 June 2014	Green
Seabird assemblage (breeding)	Regularly supports 300,000 individual seabirds including nationally important populations	n/a	Favourable Maintained	30 June 2015	n/a

500. East Caithness Cliffs SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 300,000 seabirds including nationally important populations of the following species: great black-backed gull, black-legged kittiwake, common guillemot, razorbill, cormorant, European shag, herring gull and Northern fulmar.

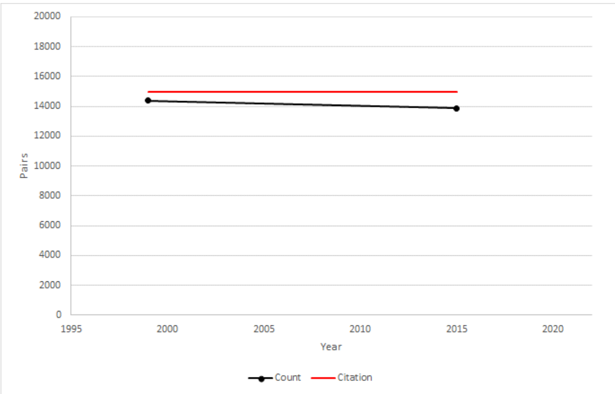
501. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) count data in 1999 and 2015 (the most recent count) was extracted from Swann (2016). These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-9**).



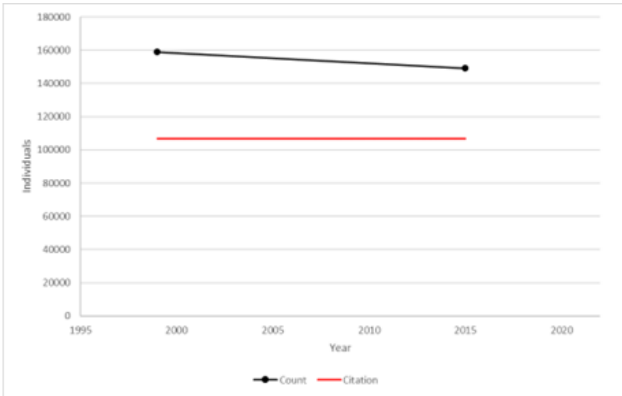
Kittiwake



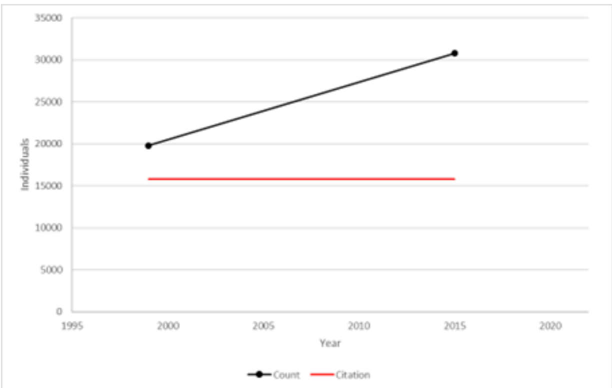
Great black-backed gull



Fulmar



Guillemot



Razorbill

Figure 6-9. East Caithness Cliffs SPA qualifying feature population trends from 1990 - 2022 (citation population size shown by red line).

6.3.7.4 Potential for the Project to impact the site's Conservation Objectives

502. The East Caithness Cliffs SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Collision impacts from the offshore Project during operation on the **great black-backed gull** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **guillemot** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **razorbill** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

503. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

504. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

505. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.7.5 Assessment of predicted impacts for Project alone and in-combination

506. An in-combination assessment was undertaken that collated quantitative information on impacts to features of this SPA from published consent applications. Note that no other OWFs have been required to undertake a quantitative assessment of fulmar displacement/barrier impacts and so an in-combination assessment was not possible for this species. This was discussed and agreed with NatureScot (consultation meeting, 11 June 2024).

507. Other reasonably foreseeable projects which have not yet submitted an application may also impact some of the qualifying features of this site. MD-LOT advised (by email, 10 June 2024)

that a qualitative assessment of OWF projects for which a Scoping Opinion has been adopted should be undertaken.

508. OWF projects for which a Scoping Opinion has been adopted and which identified possible impacts from their project on the East Caithness Cliffs SPA, in their Scoping Reports, are listed in **Table 6-48**.

Table 6-48. In-combination project with the potential to impact the East Caithness Cliffs SPA that have not yet submitted an application. Only features which could be impacted by Project impacts are listed

SPA qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Black-legged kittiwake	Y					Y
Common guillemot	Y	Y				Y
Great black-backed gull						Y
Northern fulmar	Y	Y				Y
Razorbill	Y	Y				Y

509. The predicted impacts from these projects have not been considered in the quantitative assessment of the impacts from the Project in-combination with other reasonably foreseeable projects, as it is assumed that these projects will need to consider this Project in their in-combination assessments.

6.3.7.5.1 Kittiwake

510. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the East Caithness Cliffs SPA population is presented in **Table 6-49**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-49. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities apportioned to the East Caithness Cliffs SPA and change in baseline annual adult survival rate

See ***Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts*** *for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	1.80	0.30	1.80	1.01
Mortality - Non-breeding season (NatureScot)	2.64	0.43	2.64	1.26
Mortality - Autumn migration (BDMPS)	0.95	0.12	0.95	0.41
Mortality - Spring migration (BDMPS)	1.69	0.31	1.69	0.85
Annual Project alone mortality* (collision + displacement)	5.17		6.70	
Percentage point change in annual adult survival rate	0.01%		0.01%	

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Annual in-combination mortality excl Berwick Bank	194.96		229.55	
Percentage point change in annual adult survival rate	0.40%		0.47%	
Annual in-combination mortality incl Berwick Bank	222.63		269.4	
Percentage point change in annual adult survival rate	0.45%		0.55%	

* Sum of collision plus displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.

511. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. Note, this was due to the very large kittiwake population at East Caithness Cliffs SPA, meaning change in annual adult survival rate was still below 0.02% despite a predicted annual mortality of 6.7 birds per annum.

512. As change in adult survival rate due to in-combination impacts did exceed 0.02%, and as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

513. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

514. **Table 6-50** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the kittiwake population at East Caithness Cliffs SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

515. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-50. East Caithness Cliffs SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	5.2	0.0001054982	25	0.9999	0.9999	0.0005	0.9989	1.0008	0.9975	0.9972	0.0126	0.9720	1.0201	49.7	50.5
Project alone CRM+High	6.7	0.0001368823	25	0.9999	0.9999	0.0005	0.9989	1.0007	0.9963	0.9965	0.0121	0.9723	1.0184	49.7	51.0
Incomb CRM+Low ex. BB	195.0	0.0039822145	25	0.9953	0.9953	0.0005	0.9944	0.9963	0.8849	0.8851	0.0113	0.8635	0.9074	36.5	63.0
Incomb CRM+High ex. BB	229.6	0.0046887327	25	0.9945	0.9945	0.0005	0.9935	0.9954	0.8663	0.8662	0.0112	0.8436	0.8887	34.5	65.2
Incomb CRM+Low inc. BB	222.6	0.0045474568	25	0.9947	0.9946	0.0005	0.9937	0.9956	0.8701	0.8697	0.0113	0.8477	0.8927	34.7	64.8
Incomb CRM+High inc. BB	269.4	0.0055026812	25	0.9935	0.9935	0.0005	0.9926	0.9945	0.8442	0.8444	0.0111	0.8239	0.8660	33.1	67.5
Project alone CRM+Low	5.2	0.0001054982	35	0.9999	0.9999	0.0004	0.9991	1.0007	0.9969	0.9965	0.0147	0.9685	1.0244	49.5	50.5
Project alone CRM+High	6.7	0.0001368823	35	0.9999	0.9999	0.0004	0.9990	1.0006	0.9956	0.9956	0.0145	0.9660	1.0241	49.4	50.4
Incomb CRM+Low ex. BB	195.0	0.0039822145	35	0.9953	0.9953	0.0004	0.9945	0.9961	0.8446	0.8447	0.0130	0.8191	0.8710	36.3	63.7
Incomb CRM+High ex. BB	229.6	0.0046887327	35	0.9945	0.9945	0.0004	0.9936	0.9953	0.8197	0.8199	0.0127	0.7944	0.8460	34.5	65.8
Incomb CRM+Low inc. BB	222.6	0.0045474568	35	0.9946	0.9947	0.0004	0.9938	0.9955	0.8242	0.8244	0.0129	0.7994	0.8519	34.5	65.1
Incomb CRM+High inc. BB	269.4	0.0055026812	35	0.9935	0.9935	0.0004	0.9926	0.9944	0.7916	0.7912	0.0126	0.7665	0.8162	31.2	68.0
Project alone CRM+Low	5.2	0.0001054982	50	1.0000	0.9999	0.0003	0.9993	1.0006	0.9977	0.9971	0.0176	0.9625	1.0303	49.8	50.1
Project alone CRM+High	6.7	0.0001368823	50	0.9999	0.9999	0.0003	0.9992	1.0006	0.9957	0.9958	0.0177	0.9603	1.0331	49.3	50.3
Incomb CRM+Low ex. BB	195.0	0.0039822145	50	0.9967	0.9967	0.0004	0.9960	0.9974	0.8450	0.8449	0.0157	0.8134	0.8752	37.3	62.6
Incomb CRM+High ex. BB	229.6	0.0046887327	50	0.9961	0.9961	0.0004	0.9954	0.9968	0.8200	0.8199	0.0151	0.7898	0.8497	35.1	64.5
Incomb CRM+Low inc. BB	222.6	0.0045474568	50	0.9962	0.9962	0.0004	0.9955	0.9970	0.8239	0.8249	0.0156	0.7924	0.8580	35.5	64.0
Incomb CRM+High inc. BB	269.4	0.0055026812	50	0.9954	0.9954	0.0004	0.9946	0.9962	0.7918	0.7914	0.0150	0.7601	0.8215	33.0	67.0

516. The C-PGR for Project alone impacts after 35 years for the highest impact scenario of high displacement and WCS collision was 0.9999 (95% c.i. 0.999-1.0006) (**Table 6-50**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.01%. This very small change indicates that the PVA trajectories with Project-alone impacts are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the kittiwake population will be of a similar size after 35 years, in the presence of Project impacts, as would be expected in the absence of Project impacts.

517. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9935 (95% c.i. 0.9926-0.9944) (**Table 6-50**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.65%. This predicted small change to population growth rate indicates that the kittiwake population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of 6.7 birds per annum to the in-combination total of 269.4 birds per annum (including Berwick Bank impacts).

518. The East Caithness Cliffs SPA supports the largest kittiwake population in Scotland. The kittiwake population has undergone a decline over the last 20 years (Burnell et al. 2023, SMP database), although feature condition is Favourable Maintained. Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). However, this colony was not counted in 2023. Counts at other colonies in 2023 showed an increase at some sites and a decrease at others, so it is not possible to infer whether the population at East Caithness Cliffs SPA has been impacted by HPAI or not.

519. Whilst Project impacts in combination with other OWFs impacts were predicted to reduce population growth rate to only a small extent and Project mortality is small at an estimated 6.7 birds per annum, the kittiwake population at East Caithness Cliffs SPA has shown a long-term sustained decline. Because of this, Project alone and in-combination impacts have the potential to further exacerbate any declines and might prevent or reduce the potential for this population to recover.

520. A conclusion of **no AEoSI** was reached for the **kittwake** feature of the **East Caithness Cliffs SPA**, from collision and displacement impacts from the **Project alone.**

521. However, it was **not possible to conclude no AEoSI** for the **kittiwake** feature of the **East Caithness Cliffs SPA**, from collision and displacement impacts from **in-combination** impacts, which may have the potential to undermine the conservation objective: To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

6.3.7.5.2 Great black-backed gull

522. Predicted great black-backed gull collision mortality, by season, and change to annual adult survival rate apportioned to the East Caithness Cliffs SPA population is presented in **Table 6-51.** NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts

(letter from NatureScot to the Project, dated 3 June 2024). Berwick Bank Wind Farm did not undertake a quantitative assessment for great black-backed gull because this species was rarely seen within their offshore development area. Therefore, only one set of in-combination impacts are presented.

Table 6-51. Estimated adult great black-backed gull Project alone and in-combination collision seasonal and annual mortalities apportioned to the East Caithness Cliffs SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

GREAT BLACK-BACKED GULL	Collision (WCS)
Mortality - Breeding season (NatureScot)	0.11
Mortality - Non-breeding season (NatureScot)	0.04
Mortality - Non-breeding season (BDMPS)	0.04
Annual Project alone mortality (collision)*	0.15
Percentage point change in annual adult survival rate	0.03%
Annual in-combination mortality	15.11
Percentage point change in annual adult survival rate	2.84%

** Sum of collision mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.*

523. As change in adult survival rate from the Project alone impacts exceeded the 0.02% threshold, a PVA was required for Project alone impacts.

524. Change in adult survival rate due to in-combination impacts did exceed 0.02%, but as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

525. **Table 6-52** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the great black-backed gull population at East Caithness Cliffs SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

526. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-52. East Caithness Cliffs SPA: Great black-backed gull PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included. No in-combination PVA was run.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM	0.2	0.0002831385	25	0.9997	0.9997	0.0014	0.9971	1.0025	0.9937	0.9938	0.0388	0.9216	1.0718	50.0	50.0
Project alone CRM	0.2	0.0002831385	35	0.9997	0.9997	0.0010	0.9977	1.0017	0.9904	0.9904	0.0389	0.9178	1.0686	48.8	50.8
Project alone CRM	0.2	0.0002831385	50	0.9998	0.9998	0.0007	0.9984	1.0012	0.9901	0.9904	0.0392	0.9190	1.0721	49.9	50.5

527. Project alone mortality was very small, at 0.15 birds per annum, but sufficient to warrant further assessment using a PVA due to a small population size, of 266 pairs (Burnell *et al.*, 2023) of this feature.

528. The C-PGR for Project alone impacts after 35 years for the highest impact scenario of WCS collision was 0.9997 (95% c.i. 0.9977-1.0017) (**Table 6-52**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.03%. This very small change indicates that the PVA trajectories with Project-alone impacts are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the great black-backed gull population will be of a similar size after 35 years, in the presence of Project impacts, as would be expected in the absence of Project impacts.

529. No in-combination PVA was required due to the small Project alone mortality of less than 0.2 birds per annum.

530. The great black-backed gull population at this SPA, despite being well below the citation population size, has remained stable and feature condition is Unfavourable No Change, when last assessed in June 2015. Population size at this colony decreased by 35% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023).

531. Great black-backed gull populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). This site was not counted in 2023 so any change in population size due to HPAI is unknown but the two other Scottish colonies which were counted (Hoy and Copinsay) showed a 44% and 27% decrease, suggesting the East Caithness Cliffs SPA population could also have declined due to HPAI.

532. The great black-backed gull feature of the East Caithness Cliffs SPA has remained stable, albeit less than the citation population size, although the population may have undergone a further decline recently due to HPAI impacts. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not further exacerbate any declines and will not prevent or reduce the potential for this population to recover.

533. Consequently, a conclusion of no AEoSI was reached for the great black-backed gull feature of the East Caithness Cliffs SPA, from collision impacts from the Project alone and in-combination with other OWFs.

6.3.7.5.3 Guillemot

534. Predicted guillemot displacement mortality, by season, and change to annual adult survival rate apportioned to the East Caithness Cliffs SPA population is presented in **Table 6-53**. NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts (letter from NatureScot to the Project, dated 3 June 2024). However, Berwick Bank Wind Farm did not have connectivity with any of the SPAs with guillemot features which were potentially impacted by the Project and so the in-combination assessment does not include any Berwick Bank impacts. Note, almost all breeding season Project alone guillemot mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-53. Estimated adult guillemot Project alone and in-combination displacement seasonal and annual mortalities apportioned to the East Caithness Cliffs SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

GUILLEMOT	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.01
Mortality - Non-breeding season (NatureScot)	5.69	17.08
Mortality - Non-breeding season (BDMPS)	5.70	17.09
Annual Project alone mortality* (displacement)	5.70	17.09
Percentage point change in annual adult survival rate	<0.01%	0.01%
Annual in-combination	662.77	1427.37
Percentage point change in annual adult survival rate	0.33%	0.71%

** Sum of displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

535. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, no PVA was required for Project alone impacts.

536. Change in adult survival rate due to in-combination impacts did exceed 0.02%, and as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

537. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

538. **Table 6-54** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the guillemot population at East Caithness Cliffs SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

539. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse

effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-54. East Caithness Cliffs SPA: Guillemot PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	5.6	0.000028	25	1.0000	1.0000	0.0001	0.9997	1.0002	0.9992	0.9992	0.0036	0.9923	1.0062	49.9	50.1
Project alone High	17.0	0.000085	25	0.9999	0.9999	0.0001	0.9996	1.0002	0.9977	0.9977	0.0037	0.9906	1.0053	49.4	50.8
Incomb Low	662.7	0.003314	25	0.9963	0.9963	0.0001	0.9960	0.9966	0.9089	0.9089	0.0035	0.9022	0.9155	29.3	70.4
Incomb High	1,427.4	0.007138	25	0.9921	0.9921	0.0002	0.9918	0.9924	0.8134	0.8133	0.0033	0.8066	0.8200	12.1	88.6
Project alone Low	5.6	0.000028	35	1.0000	1.0000	0.0001	0.9998	1.0002	0.9989	0.9989	0.0042	0.9913	1.0070	49.9	50.2
Project alone High	17.0	0.000085	35	0.9999	0.9999	0.0001	0.9997	1.0001	0.9967	0.9968	0.0042	0.9887	1.0051	49.6	50.5
Incomb Low	662.7	0.003314	35	0.9963	0.9963	0.0001	0.9961	0.9966	0.8758	0.8758	0.0037	0.8687	0.8832	25.8	74.0
Incomb High	1,427.4	0.007138	35	0.9921	0.9921	0.0001	0.9918	0.9923	0.7509	0.7508	0.0035	0.7442	0.7574	8.2	92.0
Project alone Low	5.6	0.000028	50	1.0000	1.0000	0.0001	0.9998	1.0002	0.9989	0.9990	0.0046	0.9901	1.0083	49.6	50.2
Project alone High	17.0	0.000085	50	0.9999	0.9999	0.0001	0.9998	1.0001	0.9968	0.9968	0.0047	0.9872	1.0060	48.9	50.6
Incomb Low	662.7	0.003314	50	0.9974	0.9974	0.0001	0.9972	0.9976	0.8753	0.8753	0.0043	0.8672	0.8836	28.5	70.8
Incomb High	1,427.4	0.007138	50	0.9944	0.9944	0.0001	0.9942	0.9946	0.7498	0.7497	0.0038	0.7422	0.7571	11.4	87.3

540. Predicted Project alone impacts on the guillemot population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

541. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement was 0.9921 (95% c.i. 0.9918-0.9923) (**Table 6-54**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.79%. This predicted small change to population growth rate indicates that the guillemot population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of only 17.1 birds per annum to the in-combination total of 1,427 birds per annum (worst case scenario).

542. The assessment was based on an assumed guillemot displacement rate of 60%, with 5% of displaced birds dying in the breeding season and 3% in the non-breeding season, under the high impact scenario. However, surveys of bird distributions within and outwith the Beatrice OWF development area prior to and following construction and operation of the OWF, have shown no compelling evidence of breeding season displacement of guillemots (Trinder *et al.*, 2024). This OWF is relatively close to the Project (approximately 90 km away) and is a similar distance from the coast where colonies of guillemots are breeding, i.e. the ecological conditions under which guillemots are using the Beatrice OWF and the Project are very similar. Evidence of guillemots being displaced from OWFs comes from studies from much further away than Beatrice (Peschko *et al.*, 2020; Peschko *et al.*, 2024). Consequently, it would be reasonable to assume that the proportion of guillemots that would be displaced from the Project in the breeding season would be much lower than the assumed 60%. This would mean that mortality on the East Caithness Cliffs SPA guillemot feature would be considerably less than predicted by this assessment.

543. The guillemot feature condition at East Caithness Cliffs SPA was Favourable Maintained, when last assessed in June 2023. Population size at this colony remained relatively stable between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). The Seabirds Count estimate of 149,228 individuals was well above the citation population size of 106,700 individuals. East Caithness Cliffs SPA supports the largest population of breeding guillemots in the UK.

544. Guillemot populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). Guillemot colonies have shown a mixed response to HPAI impacts, with some increasing and others decreasing. The East Caithness Cliffs SPA colony was not counted in 2023 and given the mixed trend in populations following HPAI impacts, it is not possible to infer whether the population at East Caithness Cliffs SPA might have increased, decreased or remained stable (Tremlett *et al.*, 2024).

545. Project alone displacement impacts on the East Caithness Cliffs SPA guillemot population were very small and will not affect long-term population size. Project impacts, in-combination with other OWFs' impacts, did indicate that population growth rate could be slightly reduced. However, the population is in Favourable Maintained condition and evidence from the Beatrice OWF suggests that guillemot displacement rates, and hence mortality, would be substantially lower than has been assumed in this assessment. Consequently, any slight

decreases in population growth rate would not be sufficient to prevent or reduce the potential for this population to be maintained at, or above, citation population size.

546. Consequently, a conclusion of no AEoSI was reached for the guillemot feature of the East Caithness Cliffs SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.7.5.4 Razorbill

547. Predicted razorbill displacement mortality, by season, and change to annual adult survival rate apportioned to the East Caithness Cliffs SPA population is presented in **Table 6-55**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-55. Estimated adult razorbill Project alone and in-combination displacement seasonal and annual mortalities apportioned to the East Caithness Cliffs SPA and change in baseline annual adult survival rate.

See ***Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts*** *for more details on calculation of mortalities and changes to survival rate.*

RAZORBILL	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.51	0.67
Mortality - Non-breeding season (NatureScot)	0.08	0.17
Mortality - Autumn migration (BDMPS)	0.04	0.08
Mortality - Winter (BDMPS)	0.00	0.00
Mortality - Spring migration (BDMPS)	0.04	0.08
Annual Project alone mortality* (displacement)	0.59	0.84
Percentage point change in annual adult survival rate	0.00%	<0.01%
Annual in-combination mortality excl Berwick Bank	77.95	162.54
Percentage point change in annual adult survival rate	0.19%	0.40%
Annual in-combination mortality incl Berwick Bank	82.37	175.82
Percentage point change in annual adult survival rate	0.20%	0.44%

** Sum of displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

548. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

549. Change in adult survival rate due to in-combination impacts did exceed 0.02% and as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

550. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

551. **Table 6-56** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the razorbill population at East Caithness Cliffs SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

552. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-56. East Caithness Cliffs SPA: Razorbill PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50^{th} centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	0.6	0.00001460777	25	1.0000	1.0000	0.0006	0.9987	1.0012	0.9993	0.9990	0.0161	0.9675	1.0305	50.1	49.9
Project alone High	0.8	0.00002087198	25	1.0000	1.0000	0.0006	0.9987	1.0013	0.9999	0.9997	0.0171	0.9658	1.0344	49.5	50.7
Incomb Low ex. BB	78.0	0.00193082630	25	0.9977	0.9978	0.0006	0.9965	0.9990	0.9430	0.9433	0.0158	0.9122	0.9731	42.3	56.1
Incomb High ex. BB	162.5	0.00402597555	25	0.9953	0.9953	0.0006	0.9940	0.9964	0.8843	0.8842	0.0149	0.8561	0.9123	33.8	65.7
Incomb Low inc. BB	82.4	0.00204015323	25	0.9976	0.9976	0.0006	0.9964	0.9988	0.9397	0.9400	0.0154	0.9102	0.9707	41.5	57.1
Incomb High inc. BB	175.8	0.00435480607	25	0.9949	0.9949	0.0007	0.9936	0.9962	0.8763	0.8759	0.0153	0.8470	0.9051	32.7	66.7
Project alone Low	0.6	0.00001460777	35	1.0000	1.0000	0.0006	0.9988	1.0011	0.9986	0.9990	0.0209	0.9596	1.0405	50.5	49.3
Project alone High	0.8	0.00002087198	35	1.0000	1.0000	0.0006	0.9988	1.0011	0.9991	0.9993	0.0215	0.9571	1.0437	49.9	50.1
Incomb Low ex. BB	78.0	0.00193082630	35	0.9978	0.9978	0.0006	0.9966	0.9989	0.9217	0.9226	0.0203	0.8854	0.9624	40.4	57.9
Incomb High ex. BB	162.5	0.00402597555	35	0.9953	0.9953	0.0006	0.9941	0.9965	0.8432	0.8432	0.0186	0.8065	0.8802	31.1	65.4
Incomb Low inc. BB	82.4	0.00204015323	35	0.9976	0.9976	0.0006	0.9964	0.9988	0.9174	0.9176	0.0199	0.8782	0.9576	39.9	58.0
Incomb High inc. BB	175.8	0.00435480607	35	0.9949	0.9949	0.0006	0.9937	0.9961	0.8318	0.8317	0.0182	0.7960	0.8691	29.5	66.9
Project alone Low	0.6	0.00001460777	50	1.0000	1.0000	0.0006	0.9988	1.0011	0.9997	0.9993	0.0296	0.9407	1.0582	50.3	50.0
Project alone High	0.8	0.00002087198	50	1.0000	1.0000	0.0006	0.9987	1.0011	0.9993	0.9987	0.0302	0.9352	1.0590	49.9	50.1
Incomb Low ex. BB	78.0	0.00193082630	50	0.9984	0.9984	0.0006	0.9972	0.9996	0.9211	0.9219	0.0277	0.8678	0.9800	40.9	57.5
Incomb High ex. BB	162.5	0.00402597555	50	0.9967	0.9967	0.0006	0.9954	0.9978	0.8428	0.8432	0.0260	0.7895	0.8930	33.0	64.0
Incomb Low inc. BB	82.4	0.00204015323	50	0.9983	0.9983	0.0006	0.9971	0.9995	0.9174	0.9170	0.0282	0.8621	0.9736	40.7	57.1
Incomb High inc. BB	175.8	0.00435480607	50	0.9964	0.9964	0.0006	0.9951	0.9975	0.8312	0.8309	0.0256	0.7790	0.8819	31.5	65.1

553. Predicted Project alone impacts on the guillemot population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

554. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, including Berwick Bank impacts, was 0.9949 (95% c.i. 0.9937-0.9961) (**Table 6-56**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.51%. This predicted small change to population growth rate indicates that the razorbill population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of only 0.84 birds per annum to the in-combination total of 175.8 birds per annum (including Berwick Bank impacts, worst case scenario).

555. The razorbill population at this SPA is now well above citation population size and feature condition is Favourable Maintained, when last assessed in June 2015. Population size at this colony increased by 69% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). East Caithness Cliffs SPA now supports the largest razorbill population in the UK. Razorbill populations are thought to have not been heavily impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). No razorbill colonies were counted in 2023 for the purpose of assessing HPAI impacts (Tremlett *et al.*, 2024).

556. Project alone displacement impacts on the East Caithness Cliffs SPA razorbill population were very small and will not affect long-term population size. Project impacts, in-combination with other OWFs' impacts, did result in a small decrease in population growth rate. However, the population is in Favourable Maintained condition, is well above citation population size and has not been impacted by HPAI. Consequently, these in-combination impacts would not be sufficient to prevent or reduce the potential for this population to be maintained at, or above, citation population size. Note also that Project alone annual razorbill mortality at this SPA was < 1 bird per annum.

557. Consequently, a conclusion of no AEoSI was reached for the razorbill feature of the North Caithness Cliffs SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.7.5.5 Fulmar

Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the East Caithness Cliffs SPA population is presented in **Table 6-57**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features.

Table 6-57. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities apportioned to the East Caithness Cliffs SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.084	0.251
Mortality - Non-breeding season (NatureScot)	0.372	1.115
Mortality - Autumn migration (BDMPS)	0.145	0.434
Mortality - Winter (BDMPS)	0.057	0.171
Mortality - Spring migration (BDMPS)	0.170	0.510
Annual Project alone mortality* (displacement)	0.455	1.366
Percentage point change in annual adult survival rate	0.002%	0.005%

** Sum of displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.*

558. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required

559. The fulmar feature at this SPA is in Favourable Maintained condition, when last assessed in June 2015. Population size at this colony was similar at the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmars were undertaken in 2023 (Tremlett *et al.*, 2024).

560. The very small predicted mortality from Project impacts on this population will not undermine the conservation objectives for this site. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the East Caithness Cliffs SPA, from displacement and barrier impacts from the Project alone. No in-combination assessment was undertaken for fulmar.

6.3.7.6 *Conclusions*

561. A conclusion of **no AEoSI** was reached for the **kittwake** feature of the **East Caithness Cliffs SPA**, from collision and displacement impacts from the **Project alone.** However, it was **not possible to conclude no AEoSI** for the **kittiwake** feature of the **East Caithness Cliffs SPA**, from collision and displacement impacts from **in-combination** impacts, which may have the potential to undermine the conservation objective: To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

562. A conclusion of **no AEoSI** was reached for the **great black-backed gull** feature of the **East Caithness Cliffs SPA**, from collision impacts from the **Project alone** and **in-combination** with other OWFs.

563. A conclusion of **no AEoSI** was reached for the **guillemot** feature of the **East Caithness Cliffs SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

564. A conclusion of **no AEoSI** was reached for the **razorbill** feature of the **East Caithness Cliffs SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

565. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **East Caithness Cliffs SPA**, from displacement impacts from the **Project alone**.

566. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, great black-backed gull, guillemot, razorbill and fulmar, for which a conclusion of no AEoSI was reached for Project alone impacts. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** impacts on the **breeding seabird assemblage** feature of **East Caithness Cliffs SPA**. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, great black-backed gull, guillemot, razorbill and fulmar. A conclusion of no AEoSI was reached for in-combination impacts for all features except for kittiwake for which it was not possible to conclude no AEoSI. Consequently, it was not possible to conclude **no AEoSI** for **in-combination** impacts on the **breeding seabird assemblage** feature of **East Caithness Cliffs SPA**.

567. Based on the above assessment, a conclusion of **no AEoSI** for **Project alone** impacts on the **East Caithness Cliffs SPA** was reached. However, it was **not possible to conclude no AEoSI** for **in-combination** impacts on the **East Caithness Cliffs SPA** due to being unable to conclude no AEoSI for the kittiwake feature**.**

6.3.8 Fair Isle SPA

6.3.8.1 Site Description

568. The Fair Isle SPA was classified on 16 December 1994, with a marine extension classified on 25 September 2009, due to the populations of breeding seabirds. The site is approximately 140 km north-east of the Project.

569. Fair Isle is an Old Red Sandstone island, the most southerly of the Shetland group, lying halfway between Shetland 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.

6.3.8.2 Conservation Objectives for the SPA

The conservation objectives of the Fair Isle SPA are:

- 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
- 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.

6.3.8.3 Qualifying features

570. The qualifying features of the SPA are presented below in **Table 6-58**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

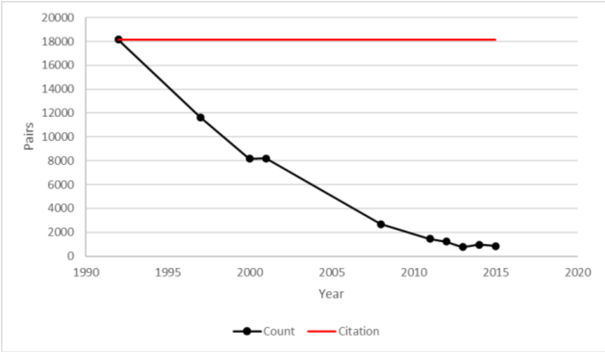
Table 6-58. Qualifying interests and condition for the Fair Isle SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake* (breeding)	18,160 pairs, 4% of the GB population	448 pairs	Unfavourable Declining	1 June 2021	Red
Arctic tern (breeding)	1100 pairs, 1% of the GB population	27 pairs	Unfavourable Recovering	1 June 2023	Red
Great Skua* (breeding)	110 pairs, 1% of the GB population	430 pairs	Favourable Maintained	1 June 2023	Amber

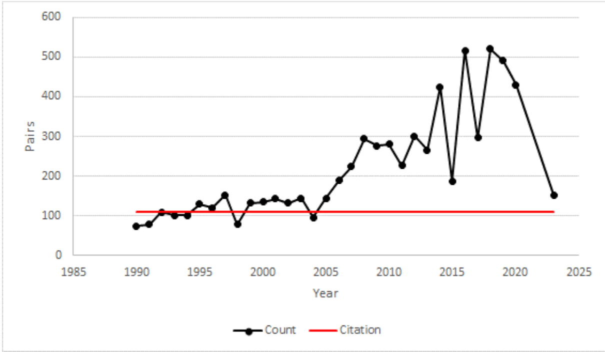
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Arctic Skua* (breeding)	110 pairs, 3% of the GB population	27 pairs	Unfavourable Recovering	1 June 2023	Red
Guillemot (breeding)	32,300 individuals, 1.4% of the north Atlantic biogeographic population	18,295 individuals	Unfavourable No change	1 June 2021	Amber
Razorbill* (breeding)	3,400 individuals, 2% of the GB population	1,925 individuals	Unfavourable No change	1 June 2021	Amber
Puffin* (breeding)	23,000 individuals, 2% of the GB population	6,666 pairs	Unfavourable Declining	1 April 2015	Red
Fulmar* (breeding)	35,210 pairs, 7% of the GB population	32,491 pairs	Favourable Maintained	1 June 2021	Amber
Gannet* (breeding)	1,166 pairs, 0.6% of the GB population	4,971 pairs	Favourable Maintained	1 June 2023	Amber
Shag* (breeding)	1,100 pairs, 3% of the GB population	94 pairs	Unfavourable Declining	1 June 2021	Red
Seabird assemblage (breeding)	Regularly supports 180,000 seabirds including nationally important populations	n/a	Unfavourable No change	1 June 2016	n/a
Fair Isle wren (breeding)	33 territorial males, 100% of the GB population	n/a	Favourable Maintained	30 June 2012	n/a

571. Fair Isle SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 180,000 seabirds including nationally important populations of the following species: Atlantic puffin, black-legged kittiwake, common guillemot, razorbill, Northern gannet, great skua, Arctic skua, Arctic tern, European shag and Northern fulmar.

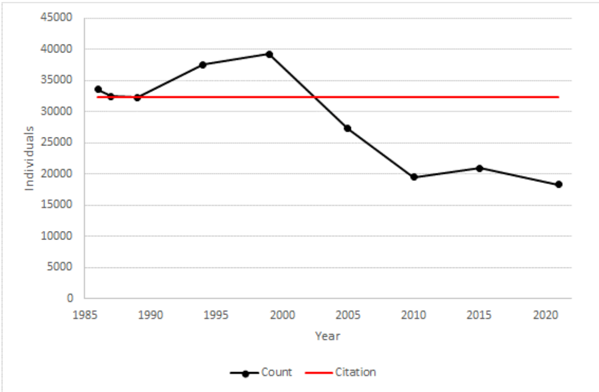
572. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) colony count data between 1986 and 2023 was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-10**).



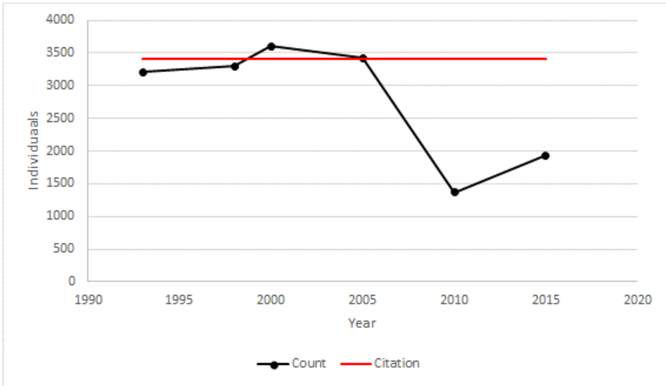
Kittiwake



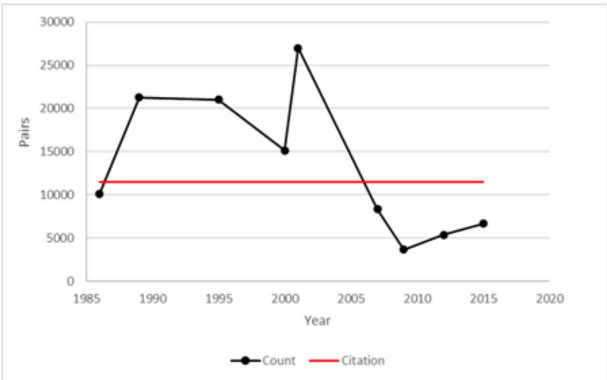
Great skua



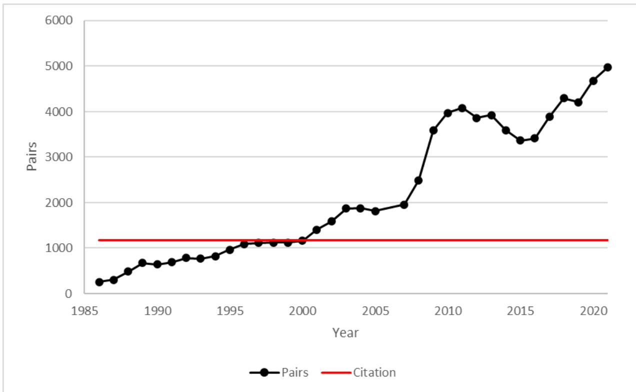
Guillemot



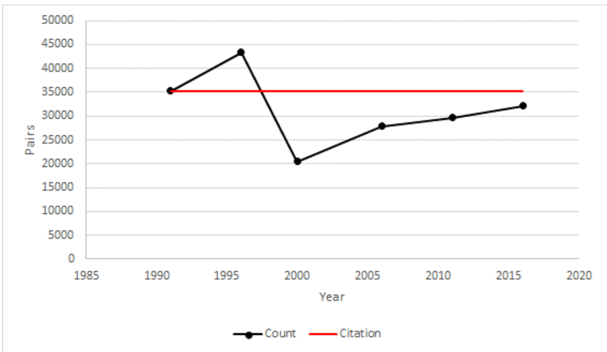
Razorbill



Puffin



Gannet



Fulmar

Figure 6-10. Fair Isle SPA qualifying feature population trends from 1986 - 2023 (citation population size shown by red line).

6.3.8.4 Potential for the Project to impact the site's conservation objectives

573. The Fair Isle SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **guillemot** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **razorbill** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **puffin** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **gannet** qualifying feature, during the breeding and non-breeding season;
- Collision impacts from the offshore Project during operation on the **great skua** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

574. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

575. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

576. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.8.5 Assessment of predicted impacts for Project alone and in-combination

577. An in-combination assessment was undertaken that collated quantitative information on impacts to features of this SPA from published consent applications. Note that no other OWFs have been required to undertake a quantitative assessment of fulmar displacement/barrier impacts and so an in-combination assessment was not possible for this species. Also, the few applicants which did consider impacts of their OWF on great skua

features of SPAs found no impact (no or very few great skuas recorded in their offshore development area). The exception to this was Berwick Bank Wind Farm which apportioned great skua mortality to only Hoy SPA. This was discussed and agreed with NatureScot (consultation meeting, 11 June 2024).

578. Other reasonably foreseeable projects which have not yet submitted an application may also impact some of the qualifying features of this site. MD-LOT advised (by email, 10 June 2024) that a qualitative assessment of OWF projects for which a Scoping Opinion has been adopted should be undertaken.

579. OWF projects for which a Scoping Opinion has been adopted and which identified possible impacts from their project on the Fair Isle SPA, in their Scoping Reports, are listed in **Table 6-59**.

Table 6-59. In-combination project with the potential to impact the Fair Isle SPA that have not yet submitted an application.

SPA qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Atlantic puffin						
Black-legged kittiwake						Y
Common guillemot						Y
Northern fulmar						Y
Northern gannet						Y
Razorbill						Y

580. The predicted impacts from these projects have not been considered in the quantitative assessment of the impacts from the Project in-combination with other reasonably foreseeable projects, as it is assumed that these projects will need to consider this Project in their in-combination assessments.

6.3.8.5.1 Kittiwake

581. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Fair Isle SPA population is presented in **Table 6-60.** In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-60. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities apportioned to the Fair Isle SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.01	0.00	0.01	0.00
Mortality - Non-breeding season (NatureScot)	0.05	0.01	0.05	0.02

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Autumn migration (BDMPS)	0.02	0.00	0.02	0.01
Mortality - Spring migration (BDMPS)	0.03	0.01	0.03	0.02
Annual Project alone mortality* (collision + displacement)	0.07		0.09	
Percentage point change in annual adult survival rate	0.01%		0.01%	
Annual in-combination mortality excl Berwick Bank	2.13		2.27	
Percentage point change in annual adult survival rate	0.24%		0.25%	
Annual in-combination mortality incl Berwick Bank	2.53		2.87	
Percentage point change in annual adult survival rate	0.28%		0.32%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

582. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

583. Change in adult survival rate due to in-combination impacts did exceed 0.02%, but as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

584. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be restored.

585. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the Fair Isle SPA, from displacement and collision impacts from the Project alone and in-combination with other OWFs.

6.3.8.5.2 Great skua

586. Predicted great skua collision mortality, by season, and change to annual adult survival rate apportioned to the Fair Isle SPA population is presented in **Table 6-61.** In-combination impacts from other OWFs apportioned no great skua mortality to this SPA, so no further assessment of in-combination impacts is required.

Table 6-61. Estimated adult great skua Project alone collision seasonal and annual mortalities (birds per annum) apportioned to the Fair Isle SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

GREAT SKUA	Collision (WCS)
Mortality - Breeding season (NatureScot)	0.00

GREAT SKUA	Collision (WCS)
Mortality - Non-breeding season (NatureScot)	0.01
Mortality - Autumn migration (BDMPS)	0.00
Mortality - Winter (BDMPS)	0.00
Mortality - Spring migration (BDMPS)	0.00
Annual Project alone mortality (collision)*	0.01
Percentage point change in annual adult survival rate	<0.01%

** Sum of collision mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

587. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination impacts from other OWFs on this feature were found.

588. Great skua feature condition is Favourable Maintained, when last assessed in June 2023. Great skua populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). Counts of great skuas on Fair Isle SPA in 2023 found a 64% decrease in population size to 153 Apparently Occupied Territories (Tremlett *et al.*, 2024).

589. Whilst this population has undergone a recent decline due to HPAI impacts, the very small Project alone impacts and the absence of any in-combination impacts will not prevent or reduce the potential for this feature to recover and to be restored.

590. Consequently, a conclusion of no AEoSI was reached for the great skua feature of the Fair Isle SPA, from collision impacts from the Project alone and in-combination.

6.3.8.5.3 Guillemot

591. Predicted guillemot displacement mortality, by season, and change to annual adult survival rate apportioned to the Fair Isle SPA population is presented in **Table 6-62**. NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts (letter from NatureScot to the Project, dated 3 June 2024). However, Berwick Bank Wind Farm did not have connectivity with any of the SPAs with guillemot features, potentially impacted by the Project and so the in-combination assessment does not include any Berwick Bank impacts.

592. Note, almost all breeding season Project alone guillemot mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-62. Estimated adult guillemot Project alone and in-combination displacement seasonal and annual mortalities apportioned to the Fair Isle SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

GUILLEMOT	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.70	2.09
Mortality - Non-breeding season (BDMPS)	0.70	2.09
Annual Project alone mortality (displacement)*	0.70	2.09
Percentage point change in annual adult survival rate	<0.01%	0.01%
Annual in-combination mortality	2.64	7.38
Percentage point change in annual adult survival rate	0.01%	0.03%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

593. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

594. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

595. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

596. **Table 6-63** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the guillemot population at Fair Isle SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

597. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-63. Fair Isle SPA: Guillemot PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	0.7	0.000028	25	1.0000	1.0000	0.0004	0.9992	1.0008	0.9999	0.9997	0.0104	0.9793	1.0206	50.4	49.6
Project alone High	2.1	0.000085	25	0.9999	0.9999	0.0004	0.9992	1.0007	0.9974	0.9978	0.0105	0.9778	1.0188	49.3	50.7
Incomb Low	2.6	0.000108	25	0.9999	0.9999	0.0004	0.9992	1.0006	0.9969	0.9974	0.0104	0.9768	1.0180	49.2	50.4
Incomb High	7.4	0.000301	25	0.9997	0.9997	0.0004	0.9989	1.0004	0.9916	0.9918	0.0101	0.9723	1.0113	48.8	52.1
Project alone Low	0.7	0.000028	35	1.0000	1.0000	0.0003	0.9994	1.0006	0.9991	0.9993	0.0118	0.9762	1.0222	49.6	50.4
Project alone High	2.1	0.000085	35	0.9999	0.9999	0.0003	0.9993	1.0005	0.9963	0.9968	0.0118	0.9754	1.0194	49.6	50.7
Incomb Low	2.6	0.000108	35	0.9999	0.9999	0.0003	0.9993	1.0005	0.9958	0.9962	0.0114	0.9744	1.0196	49.5	50.7
Incomb High	7.4	0.000301	35	0.9997	0.9997	0.0003	0.9991	1.0003	0.9881	0.9883	0.0115	0.9662	1.0109	48.6	52.4
Project alone Low	0.7	0.000028	50	1.0000	1.0000	0.0003	0.9995	1.0005	0.9991	0.9992	0.0133	0.9743	1.0275	50.0	50.1
Project alone High	2.1	0.000085	50	0.9999	0.9999	0.0002	0.9995	1.0004	0.9965	0.9968	0.0130	0.9728	1.0234	49.9	50.1
Incomb Low	2.6	0.000108	50	0.9999	0.9999	0.0002	0.9995	1.0004	0.9958	0.9961	0.0127	0.9714	1.0221	50.0	50.1
Incomb High	7.4	0.000301	50	0.9998	0.9998	0.0002	0.9993	1.0003	0.9879	0.9885	0.0128	0.9635	1.0153	48.0	51.1

598. Predicted Project alone impacts on the guillemot population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

599. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement 0.9997 (95% c.i. 0.9991-1.0003) (**Table 6-63**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.03%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the guillemot population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Note, the Project contributed a mortality of only 2 birds per annum to the in-combination impacts (worst case scenario).

600. The guillemot feature condition is Unfavourable No Change. Population size at this colony decreased by 53% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). Guillemot populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The Fair Isle SPA guillemot population was not counted in 2023 so any change in population size due to HPAI is unknown. Two Orkney colonies which were counted in 2023 showed marked differences in their population trend, with a 56% decline at Copinsay and a 7% increase at West Westray. Consequently, it is very difficult to predict whether the Fair Isle SPA guillemot population has remained stable or decreased due to HPAI impacts.

601. Whilst the guillemot population at the Fair Isle SPA is substantially smaller than citation population size and could have declined further due to HPAI impacts, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not further exacerbate any declines and will not prevent or reduce the potential for this population to recover.

602. Consequently, a conclusion of no AEoSI was reached for the guillemot feature of the Fair Isle SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.8.5.4 Razorbill

603. Predicted razorbill displacement mortality, by season, and change to annual adult survival rate apportioned to the Fair Isle SPA population is presented in **Table 6-64**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-64. Estimated adult razorbill Project alone and in-combination displacement seasonal and annual mortalities apportioned to the Fair Isle SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts for more details on calculation of mortalities and changes to survival rate.

RAZORBILL	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.01	0.01
Mortality - Non-breeding season (NatureScot)	0.01	0.01
Mortality - Autumn migration (BDMPS)	0.01	0.01
Mortality - Winter (BDMPS)	0.01	0.00
Mortality - Spring migration (BDMPS)	0.01	0.01
Annual Project mortality alone* (displacement)	0.01	0.02
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination mortality excl Berwick Bank	1.81	5.39
Percentage point change in annual adult survival rate	0.07	0.21%
Annual in-combination mortality incl Berwick Bank	2.12	6.32
Percentage point change in annual adult survival rate	0.08%	0.24%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

604. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

605. Change in adult survival rate due to in-combination impacts did exceed 0.02%, but as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

606. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be maintained.

607. Consequently, a conclusion of no AEoSI was reached for the razorbill feature of the Fair Isle SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.8.5.5 Puffin

608. Predicted puffin displacement mortality, by season, and change to annual adult survival rate apportioned to the Fair Isle SPA population is presented in **Table 6-65**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-65. Estimated adult puffin Project alone and in-combination displacement seasonal and annual mortalities apportioned to the Fair Isle SPA and change in baseline annual adult survival rate.
See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

PUFFIN	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.18	0.53
Mortality - Non-breeding season (BDMPS)	0.18	0.53
Annual Project alone mortality (Displacement)*	0.18	0.53
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination mortality excl Berwick Bank	4.34	10.10
Percentage point change in annual adult survival rate	0.033%	0.076%
Annual in-combination mortality incl Berwick Bank	5.08	12.32
Percentage point change in annual adult survival rate	0.038%	0.092%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

609. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

610. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

611. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

612. **Table 6-66** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and

Q-IMP) from the PVA model run for the puffin population at Fair Isle SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

613. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-66. Fair Isle SPA: Puffin PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	0.2	0.00001300000	25	1.0001	1.0000	0.0011	0.9978	1.0022	1.0009	1.0013	0.0295	0.9430	1.0608	50.4	49.8
Project alone High	0.5	0.00003993038	25	1.0000	1.0000	0.0011	0.9978	1.0023	0.9996	1.0006	0.0302	0.9424	1.0623	50.3	49.8
Incomb Low ex. BB	4.3	0.00032600000	25	0.9996	0.9996	0.0012	0.9974	1.0019	0.9899	0.9906	0.0302	0.9310	1.0518	48.6	51.0
Incomb High ex. BB	10.1	0.00075756978	25	0.9991	0.9991	0.0012	0.9969	1.0014	0.9776	0.9781	0.0299	0.9193	1.0357	47.4	52.2
Incomb Low inc. BB	5.1	0.00038100000	25	0.9996	0.9996	0.0012	0.9974	1.0019	0.9900	0.9907	0.0301	0.9347	1.0499	48.1	50.9
Incomb High inc. BB	12.3	0.00092380294	25	0.9990	0.9990	0.0011	0.9968	1.0013	0.9741	0.9754	0.0293	0.9191	1.0369	46.6	52.2
Project alone Low	0.2	0.00001300000	35	1.0001	1.0000	0.0012	0.9977	1.0022	1.0020	1.0015	0.0418	0.9214	1.0833	50.3	49.7
Project alone High	0.5	0.00003993038	35	1.0000	1.0000	0.0011	0.9978	1.0023	0.9997	1.0007	0.0408	0.9233	1.0866	49.7	50.3
Incomb Low ex. BB	4.3	0.00032600000	35	0.9996	0.9996	0.0011	0.9974	1.0018	0.9877	0.9877	0.0396	0.9094	1.0657	49.0	51.3
Incomb High ex. BB	10.1	0.00075756978	35	0.9991	0.9991	0.0011	0.9969	1.0013	0.9703	0.9697	0.0404	0.8942	1.0473	48.4	51.9
Incomb Low inc. BB	5.1	0.00038100000	35	0.9996	0.9996	0.0011	0.9973	1.0018	0.9859	0.9867	0.0404	0.9115	1.0690	48.4	51.7
Incomb High inc. BB	12.3	0.00092380294	35	0.9990	0.9990	0.0011	0.9970	1.0012	0.9632	0.9652	0.0387	0.8956	1.0465	47.4	52.9
Project alone Low	0.2	0.00001300000	50	1.0000	1.0000	0.0012	0.9976	1.0026	1.0011	1.0041	0.0638	0.8825	1.1395	50.1	49.8
Project alone High	0.5	0.00003993038	50	1.0000	1.0000	0.0012	0.9974	1.0025	1.0000	1.0023	0.0628	0.8763	1.1387	50.6	48.8
Incomb Low ex. BB	4.3	0.00032600000	50	0.9997	0.9998	0.0012	0.9973	1.0022	0.9869	0.9896	0.0619	0.8694	1.1228	49.3	51.1
Incomb High ex. BB	10.1	0.00075756978	50	0.9994	0.9994	0.0012	0.9970	1.0018	0.9708	0.9714	0.0597	0.8585	1.0962	48.7	51.5
Incomb Low inc. BB	5.1	0.00038100000	50	0.9998	0.9997	0.0012	0.9974	1.0020	0.9890	0.9882	0.0593	0.8733	1.1048	49.4	50.4
Incomb High inc. BB	12.3	0.00092380294	50	0.9993	0.9993	0.0012	0.9970	1.0018	0.9626	0.9669	0.0601	0.8582	1.0955	48.5	51.7

614. Predicted Project alone impacts on the puffin population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

615. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, including Berwick Bank impacts, was 0.9990 (95% c.i. 0.9970-1.0012) (**Table 6-66**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.1%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the puffin population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Note, the Project contributed a mortality of only 0.5 birds per annum to the in-combination total (including Berwick Bank impacts, worst case scenario).

616. The puffin feature is well below citation population size and condition is Unfavourable Declining, when last assessed in April 2015. Population size at this colony increased by 56% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). There is no evidence of puffin populations being impacted by the HPAI epidemic and no additional counts of puffins on Fair Isle SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

617. Whilst the puffin population on Fair Isle SPA has substantially declined, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any future declines that might occur and will not prevent or reduce the potential for this population to be restored.

618. Consequently, a conclusion of no AEoSI was reached for the puffin feature of the Fair Isle SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.8.5.6 Gannet

619. Predicted gannet collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Fair Isle SPA population is presented in **Table 6-67**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

620. Note, almost all breeding season Project alone gannet mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-67. Estimated adult gannet Project alone and in-combination collision and displacement seasonal and annual mortalities apportioned to the Fair Isle SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

GANNET	Collision (WCS)	Low Displacement (70%/1%)	Collision (WCS)	High Displacement (70%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.15	0.15	0.15	0.46
Mortality - Autumn migration (BDMPS)	0.11	0.13	0.11	0.40
Mortality - Spring migration (BDMPS)	0.04	0.02	0.04	0.06
Annual Project alone mortality* (collision + displacement)	0.30		0.61	
Percentage point change in annual adult survival rate	0.003%		0.006%	
Annual in-combination mortality excl Berwick Bank	22.33		30.14	
Percentage point change in annual adult survival rate	0.22%		0.30%	
Annual in-combination mortality incl Berwick Bank	22.75		30.55	
Percentage point change in annual adult survival rate	0.23%		0.31%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

621. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

622. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

623. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

624. **Table 6-68** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the gannet population at Fair Isle SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. Appendix 8 - HRA: PVA at SPA

population scales for Project alone and in-combination impacts includes information on all inputs to this PVA and a plot showing population size over time.

625. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See Section 5.4.7 for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-68. Fair Isle SPA: Gannet PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	0.3	0.00003041290	25	1.0000	1.0000	0.0008	0.9984	1.0017	1.0000	1.0001	0.0222	0.9568	1.0438	49.2	51.1
Project alone CRM+High	0.6	0.00006126355	25	0.9999	0.9999	0.0008	0.9983	1.0015	0.9986	0.9984	0.0216	0.9549	1.0395	48.5	50.8
Incomb CRM+Low ex. BB	22.3	0.00224615843	25	0.9974	0.9974	0.0008	0.9959	0.9990	0.9343	0.9346	0.0203	0.8976	0.9751	34.4	65.4
Incomb CRM+High ex. BB	30.1	0.00303149153	25	0.9965	0.9965	0.0008	0.9949	0.9980	0.9118	0.9123	0.0199	0.8740	0.9511	29.3	70.4
Incomb CRM+Low inc. BB	22.7	0.00228785831	25	0.9974	0.9974	0.0008	0.9959	0.9989	0.9347	0.9341	0.0198	0.8955	0.9730	34.4	64.9
Incomb CRM+High inc. BB	30.6	0.00307319140	25	0.9964	0.9964	0.0008	0.9947	0.9979	0.9114	0.9112	0.0203	0.8672	0.9509	29.2	70.2
Project alone CRM+Low	0.3	0.00003041290	35	1.0000	1.0000	0.0007	0.9987	1.0014	0.9989	1.0005	0.0251	0.9534	1.0503	49.4	50.4
Project alone CRM+High	0.6	0.00006126355	35	0.9999	0.9999	0.0007	0.9986	1.0013	0.9970	0.9984	0.0252	0.9482	1.0496	49.4	50.5
Incomb CRM+Low ex. BB	22.3	0.00224615843	35	0.9974	0.9974	0.0007	0.9961	0.9988	0.9093	0.9105	0.0232	0.8692	0.9589	32.7	66.6
Incomb CRM+High ex. BB	30.1	0.00303149153	35	0.9964	0.9965	0.0007	0.9952	0.9978	0.8804	0.8806	0.0223	0.8413	0.9268	26.1	71.5
Incomb CRM+Low inc. BB	22.7	0.00228785831	35	0.9974	0.9973	0.0007	0.9961	0.9987	0.9089	0.9091	0.0223	0.8678	0.9540	31.9	66.6
Incomb CRM+High inc. BB	30.6	0.00307319140	35	0.9964	0.9964	0.0007	0.9951	0.9976	0.8783	0.8788	0.0223	0.8341	0.9236	26.2	72.1
Project alone CRM+Low	0.3	0.00003041290	50	1.0000	1.0000	0.0006	0.9989	1.0011	0.9994	0.9998	0.0295	0.9407	1.0602	49.8	50.5
Project alone CRM+High	0.6	0.00006126355	50	0.9999	1.0000	0.0005	0.9988	1.0011	0.9972	0.9985	0.0288	0.9434	1.0555	49.4	50.4
Incomb CRM+Low ex. BB	22.3	0.00224615843	50	0.9981	0.9981	0.0006	0.9970	0.9993	0.9081	0.9094	0.0275	0.8577	0.9669	34.7	65.5
Incomb CRM+High ex. BB	30.1	0.00303149153	50	0.9975	0.9975	0.0005	0.9965	0.9986	0.8781	0.8793	0.0256	0.8328	0.9318	30.4	69.7
Incomb CRM+Low inc. BB	22.7	0.00228785831	50	0.9981	0.9981	0.0005	0.9970	0.9992	0.9067	0.9076	0.0256	0.8600	0.9581	34.7	65.6
Incomb CRM+High inc. BB	30.6	0.00307319140	50	0.9974	0.9974	0.0006	0.9963	0.9985	0.8771	0.8777	0.0260	0.8297	0.9302	30.3	70.2

626. Predicted Project alone impacts on the gannet population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

627. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9964 (95% c.i. 0.9951-0.9976) (**Table 6-68**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.36%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the gannet population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Note, the Project contributed a mortality of only <1 bird per annum to the in-combination total of 31 birds per annum (including Berwick Bank impacts, worst case scenario).

628. The gannet feature condition was Favourable Maintained, when last assessed in June 2023. The Fair Isle SPA colony is the smallest in Scotland but, like many gannet populations, has undergone a large increase and is above citation population size of 1,166 pairs. Population size at this colony increased by 165% between the two seabird censuses, Seabird 2000 and Seabirds Count, to 4,971 pairs (Burnell *et al.*, 2023). Gannet populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The Fair Isle SPA gannet population was not counted in 2023 so any change in population size due to HPAI is unknown. Most gannet colonies showed a substantial decline, when counted in 2023, and so it is likely that this population has also declined recently.

629. The gannet population at Fair Isle SPA, when last counted, was above citation population size and feature condition is Favourable Maintained. As the Project alone and in-combination impacts on this population are predicted to be very small they will not exacerbate any declines which may occur and will not prevent or reduce the potential for this population to be maintained.

630. Consequently, a conclusion of no AEoSI was reached for the gannet feature of the Fair Isle SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.8.5.7 Fulmar

631. Predicted fulmar displacement and barrier mortality, by season, and change to annual adult survival rate apportioned to the Fair Isle SPA population is presented in **Table 6-69**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features.

Table 6-69. Estimated adult fulmar Project alone displacement seasonal and annual mortalities apportioned to the Fair Isle SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.049	0.147
Mortality - Non-breeding season (NatureScot)	0.710	2.131
Mortality - Autumn migration (BDMPS)	0.272	0.816
Mortality - Winter (BDMPS)	0.119	0.356
Mortality - Spring migration (BDMPS)	0.319	0.958
Annual Project alone mortality* (displacement)	0.759	2.277
Percentage point change in annual adult survival rate	0.001%	0.004%

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

632. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination assessment was undertaken for fulmar.

633. Fulmar feature condition is Favourable Maintained, when last assessed in June 2021. There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmar at Fair Isle SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

634. The very small predicted mortality from Project impacts on this population will not prevent or reduce the potential for this feature to be maintained.

635. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the Fair Isle SPA, from displacement and barrier impacts from the Project alone. No in-combination assessment was undertaken for fulmar.

6.3.8.6 Conclusions

636. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Fair Isle SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

637. A conclusion of **no AEoSI** was reached for the **great skua** feature of the **Fair Isle SPA**, from collision impacts from the **Project alone** and **in-combination** with other OWFs.

638. A conclusion of **no AEoSI** was reached for the **guillemot** feature of the **Fair Isle SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

639. A conclusion of **no AEoSI** was reached for the **razorbill** feature of the **Fair Isle SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

640. A conclusion of **no AEoSI** was reached for the **puffin** feature of the **Fair Isle SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

641. A conclusion of **no AEoSI** was reached for the **gannet** feature of the **Fair Isle SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

642. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Fair Isle SPA**, from displacement impacts from the **Project alone**.

643. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, great skua, guillemot, razorbill, puffin, gannet and fulmar, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Fair Isle SPA**.

644. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Fair Isle SPA** was reached.

6.3.9 Farne Islands SPA

6.3.9.1 Site Description

645. The Farne Islands SPA was classified in July 1985, with an update in September 2018, due to the populations of breeding seabirds. The site is approximately 383 km south-east of the Project.

646. The Farne Islands are a group of rocky Islands stretching from between 2.4 to 7.6 kilometres offshore. The islands are rocky plateaus formed from Whin Sill rock, the total area of all the islands is 101ha consisting of 15 – 20 islands depending on tide, they are split into the Inner Farnes and the Outer Farnes. The botanical interest is limited but the islands are famous as a breeding ground for grey seal and as a seabird nesting colony.

647. The Northumberland coast and surrounding sea supports important breeding colonies of seabirds and auks, protected at four existing SPAs: Farne Islands SPA, Coquet Island SPA, Lindisfarne SPA and Northumbria Coast SPA. The surrounding waters are protected by Northumberland Marine SPA, these areas are used by the seabirds and auks for foraging and maintenance activities, such as bathing and preening.

6.3.9.2 Conservation Objectives for the SPA

648. The conservation objectives of the Farne Islands SPA are to:

- 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 Wild Birds Directive[30], by maintaining or restoring;
- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The population of each of the qualifying features, and,
- The distribution of the qualifying features within the site.

6.3.9.3 Qualifying features

649. The qualifying features of the SPA are presented below in **Table 6-70**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

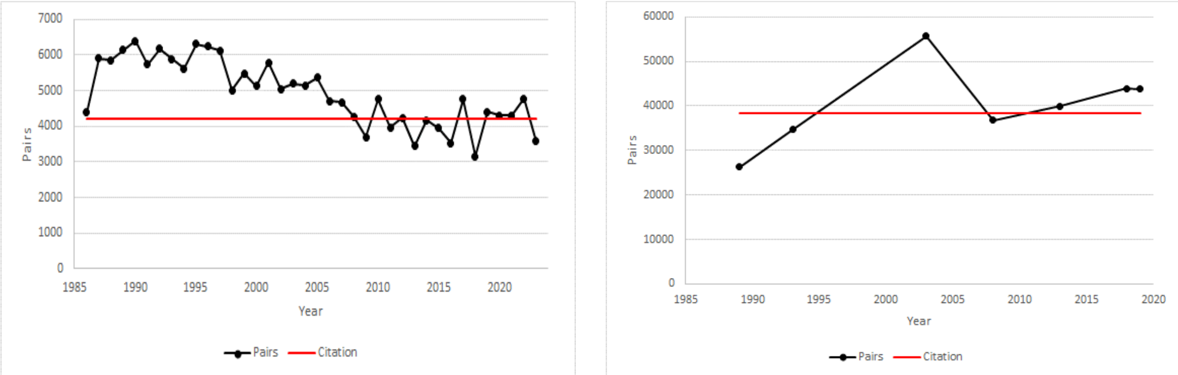
[30] https://environment.ec.europa.eu/topics/nature-and-biodiversity/birds-directive_en

Table 6-70. Qualifying interests and condition for the Farne Islands SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake*	8,241 breeding adult individuals (4,121 pairs)	4,402 pairs	Not available	n/a	Red
Sandwich tern	862 pairs, 1,724 individuals (2010-2014) 7.84% of GB population	424 pairs	Not available	n/a	Amber
Roseate tern	13 pairs, 26 individuals 1.88% of GB population (1985)	n/a	Not available	n/a	Red
Common tern	183 pairs, 366 individuals 1.69% of GB population (1985)	67 pairs	Not available	n/a	Amber
Arctic tern	2,003 pairs, 4,006 individuals (2010-2014) 3.78% of GB population	1,735 pairs	Not available	n/a	Amber
Guillemot	32,875 pairs, 65,751 individuals (2010-2014) 1.72% of *aalge* biogeographic population	64,042 individuals	Not available	n/a	Amber
Puffin*	76,798 breeding adults	43,752 pairs	Not available	n/a	Red
Cormorant*	230 breeding adults	83 pairs	Not available	n/a	Green
Shag*	1,677 breeding adults	484 pairs	Not available	n/a	Red
Seabird assemblage	supports 163,819 individual seabirds	n/a	Not available	n/a	n/a

650. Farne Islands SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 142,490 individual breeding seabirds including nationally important populations of the following species: Atlantic puffin, great cormorant, European shag, black-legged kittiwake, common guillemot, common tern, Arctic tern, roseate tern and Sandwich tern.

651. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) count data between 1985 and 2023 (the most recent count) was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-11**).



Kittiwake

Puffin

Figure 6-11. Farne Islands SPA qualifying feature population trends from 1985 - 2023 (citation population size shown by red line).

6.3.9.4 *Potential for the Project to impact the site's conservation objectives*

652. The Farne Islands SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **puffin** qualifying feature, during the non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the non-breeding season.

653. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

654. These predicted impacts have the potential to undermine the conservation objective:

- 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 Wild Birds Directive, by maintaining or restoring the population of each of the qualifying features.

655. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.9.5 *Assessment of predicted impacts for Project alone and in-combination*

656. Other reasonably foreseeable projects which have not yet submitted an application may also impact some of the qualifying features of this site. MD-LOT advised (by email, 10 June 2024) that a qualitative assessment of OWF projects for which a Scoping Opinion has been adopted should be undertaken.

657. OWF projects for which a Scoping Opinion has been adopted and which identified possible impacts from their project on the Farne Islands SPA, in their Scoping Reports, are listed in **Table 6-71**.

Table 6-71. In-combination project with the potential to impact the Farne Islands SPA that have not yet submitted an application.

SPA qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Common guillemot			Y			

658. The predicted impacts from these projects have not been considered in the quantitative assessment of the impacts from the Project in-combination with other reasonably foreseeable projects, as it is assumed that these projects will need to consider this Project in their in-combination assessments.

6.3.9.5.1 Kittiwake

659. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Farne Islands SPA population is presented in **Table 6-72**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-72. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities apportioned to the Farne Islands SPA and change in baseline annual adult survival rate.
See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.23	0.04	0.23	0.11
Mortality - Autumn migration (BDMPS)	0.08	0.01	0.08	0.03
Mortality - Spring migration (BDMPS)	0.14	0.03	0.14	0.07
Annual Project alone mortality* (collision + displacement)	0.26		0.33	
Percentage point change in annual adult survival rate	<0.01%		<0.01%	
Annual in-combination excl Berwick Bank	16.97		18.21	

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Percentage point change in annual adult survival rate	0.19%		0.21%	
Annual in-combination incl Berwick Bank	50.94		62.02	
Percentage point change in annual adult survival rate	0.58%		0.70%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

660. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

661. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

662. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

663. **Table 6-73** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the kittiwake population at Farne Islands SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

664. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-73. Farne Islands SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	0.3	0.00002969095	25	1.0000	1.0000	0.0011	0.9978	1.0023	0.9992	0.9998	0.0299	0.9467	1.0637	50.3	49.8
Project alone CRM+High	0.3	0.00003775063	25	0.9999	0.9999	0.0011	0.9978	1.0022	0.9978	0.9987	0.0287	0.9441	1.0616	49.5	50.7
Incomb CRM+Low ex. BB	17.0	0.00192730533	25	0.9978	0.9978	0.0011	0.9955	1.0000	0.9431	0.9438	0.0289	0.8885	1.0002	43.3	56.0
Incomb CRM+High ex. BB	18.2	0.00206833574	25	0.9975	0.9976	0.0011	0.9954	0.9998	0.9392	0.9393	0.0280	0.8842	0.9982	42.6	56.9
Incomb CRM+Low inc. BB	50.9	0.00578598296	25	0.9932	0.9932	0.0012	0.9908	0.9955	0.8373	0.8368	0.0264	0.7866	0.8897	34.1	69.3
Incomb CRM+High inc. BB	62.0	0.00704493764	25	0.9917	0.9917	0.0011	0.9895	0.9939	0.8044	0.8050	0.0243	0.7605	0.8545	30.2	72.0
Project alone CRM+Low	0.3	0.00002969095	35	1.0000	1.0000	0.0009	0.9981	1.0018	0.9980	0.9993	0.0349	0.9350	1.0712	49.7	50.1
Project alone CRM+High	0.3	0.00003775063	35	0.9999	0.9999	0.0009	0.9981	1.0018	0.9958	0.9965	0.0336	0.9303	1.0659	49.3	50.4
Incomb CRM+Low ex. BB	17.0	0.00192730533	35	0.9977	0.9977	0.0010	0.9958	0.9998	0.9196	0.9214	0.0336	0.8593	0.9901	43.3	56.3
Incomb CRM+High ex. BB	18.2	0.00206833574	35	0.9975	0.9975	0.0010	0.9957	0.9995	0.9156	0.9154	0.0318	0.8581	0.9786	43.2	56.7
Incomb CRM+Low inc. BB	50.9	0.00578598296	35	0.9931	0.9931	0.0010	0.9912	0.9950	0.7793	0.7803	0.0284	0.7264	0.8371	29.6	69.8
Incomb CRM+High inc. BB	62.0	0.00704493764	35	0.9917	0.9916	0.0010	0.9895	0.9937	0.7392	0.7397	0.0275	0.6857	0.7964	25.4	73.5
Project alone CRM+Low	0.3	0.00002969095	50	0.9999	1.0000	0.0008	0.9983	1.0015	0.9965	0.9987	0.0418	0.9162	1.0837	50.0	50.0
Project alone CRM+High	0.3	0.00003775063	50	0.9999	0.9999	0.0008	0.9983	1.0016	0.9956	0.9963	0.0416	0.9141	1.0873	49.7	50.2
Incomb CRM+Low ex. BB	17.0	0.00192730533	50	0.9984	0.9984	0.0009	0.9966	1.0002	0.9203	0.9212	0.0422	0.8409	1.0078	43.4	55.9
Incomb CRM+High ex. BB	18.2	0.00206833574	50	0.9983	0.9982	0.0009	0.9966	0.9998	0.9147	0.9151	0.0398	0.8375	0.9951	43.1	56.4
Incomb CRM+Low inc. BB	50.9	0.00578598296	50	0.9951	0.9951	0.0009	0.9933	0.9968	0.7795	0.7799	0.0350	0.7056	0.8497	31.1	68.2
Incomb CRM+High inc. BB	62.0	0.00704493764	50	0.9941	0.9941	0.0009	0.9924	0.9958	0.7387	0.7393	0.0339	0.6759	0.8068	28.3	71.6

665. Predicted Project alone impacts on the kittiwake population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

666. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9916 (95% c.i. 0.9895-0.9937) (**Table 6-73**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.84%. This predicted small change to population growth rate indicates that the kittiwake population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of only 0.3 birds per annum to the in-combination total of 62 birds per annum (including Berwick Bank Wind Farm impacts, worst case scenario). The in-combination total excluding Berwick Bank Wind Farm impacts was 18 birds per annum, which resulted in a change in population growth rate of 0.25%, i.e. Berwick Bank Wind Farm impacts comprise a substantial proportion of the in-combination impacts.

667. The kittiwake population of the Farne Islands SPA is a named component of the breeding seabird assemblage feature and not a qualifying feature in its own right. Feature condition has not been assessed and no citation population size is provided[31]. Population size at this colony decreased by 14% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The Farne Islands SPA kittiwake population had declined by a further 17% when counted in 2023.

668. Whilst the kittiwake population at the Farne Islands SPA has shown small declines, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not further exacerbate any declines and will not prevent or reduce the potential for this population to recover or be maintained.

669. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the Farne Islands SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.9.5.2 Puffin

670. Predicted puffin displacement mortality, by season, and change to annual adult survival rate apportioned to the Farne Islands SPA population is presented in **Table 6-74.** In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

671. Note, almost all breeding season Project alone puffin mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

[31] *Designated Sites View (naturalengland.org.uk)*

Table 6-74. Estimated adult puffin Project alone and in-combination displacement seasonal and annual mortalities apportioned to the Farne Islands SPA and change in baseline annual adult survival rate.

See ***Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts*** *for more details on calculation of mortalities and changes to survival rate.*

PUFFIN	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	2.21	6.62
Mortality - Non-breeding season (BDMPS)	2.21	6.62
Annual Project alone mortality (displacement)*	2.21	6.62
Percentage point change in annual adult survival rate	<0.01%	0.01%
Annual in-combination excl Berwick Bank	45.04	110.68
Percentage point change in annual adult survival rate	0.05%	0.13%
Annual in-combination incl Berwick Bank	75.98	174.51
Percentage point change in annual adult survival rate	0.09%	0.20%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

672. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

673. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

674. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

675. **Table 6-75** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the puffin population at the Farne Islands SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

676. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-75. Farne Islands SPA: Puffin PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	2.2	0.00002523155	25	0.9999	1.0000	0.0004	0.9991	1.0009	0.9986	0.9991	0.0120	0.9757	1.0237	49.8	50.0
Project alone High	6.6	0.00007569466	25	0.9999	0.9999	0.0004	0.9990	1.0008	0.9973	0.9974	0.0118	0.9737	1.0206	49.8	50.2
Incomb Low ex. BB	45.0	0.00051472800	25	0.9994	0.9994	0.0005	0.9985	1.0003	0.9841	0.9844	0.0119	0.9606	1.0086	48.3	51.3
Incomb High ex. BB	110.7	0.00126489410	25	0.9985	0.9985	0.0005	0.9976	0.9994	0.9622	0.9619	0.0120	0.9396	0.9858	45.6	53.7
Incomb Low inc. BB	76.0	0.00086834770	25	0.9990	0.9990	0.0004	0.9981	0.9999	0.9740	0.9738	0.0116	0.9505	0.9972	47.2	52.6
Incomb High inc. BB	174.5	0.00199431611	25	0.9977	0.9977	0.0005	0.9968	0.9986	0.9415	0.9413	0.0116	0.9174	0.9627	44.2	55.4
Project alone Low	2.2	0.00002523155	35	1.0000	1.0000	0.0004	0.9991	1.0008	0.9984	0.9987	0.0159	0.9676	1.0316	50.5	49.5
Project alone High	6.6	0.00007569466	35	0.9999	0.9999	0.0004	0.9991	1.0008	0.9959	0.9967	0.0156	0.9669	1.0292	49.6	50.5
Incomb Low ex. BB	45.0	0.00051472800	35	0.9994	0.9994	0.0005	0.9985	1.0003	0.9783	0.9786	0.0162	0.9487	1.0113	48.5	51.7
Incomb High ex. BB	110.7	0.00126489410	35	0.9985	0.9985	0.0004	0.9976	0.9994	0.9481	0.9480	0.0152	0.9186	0.9793	44.6	53.3
Incomb Low inc. BB	76.0	0.00086834770	35	0.9990	0.9990	0.0004	0.9981	0.9999	0.9637	0.9641	0.0156	0.9344	0.9960	46.3	52.5
Incomb High inc. BB	174.5	0.00199431611	35	0.9977	0.9977	0.0005	0.9968	0.9986	0.9190	0.9195	0.0155	0.8894	0.9505	42.2	55.2
Project alone Low	2.2	0.00002523155	50	1.0000	1.0000	0.0005	0.9990	1.0009	0.9977	0.9977	0.0240	0.9512	1.0478	49.9	50.1
Project alone High	6.6	0.00007569466	50	0.9999	0.9999	0.0004	0.9990	1.0008	0.9959	0.9963	0.0226	0.9531	1.0416	49.9	50.1
Incomb Low ex. BB	45.0	0.00051472800	50	0.9996	0.9996	0.0005	0.9987	1.0005	0.9783	0.9790	0.0236	0.9330	1.0265	48.7	51.6
Incomb High ex. BB	110.7	0.00126489410	50	0.9989	0.9990	0.0005	0.9980	0.9999	0.9473	0.9484	0.0226	0.9036	0.9941	45.5	53.5
Incomb Low inc. BB	76.0	0.00086834770	50	0.9993	0.9993	0.0005	0.9984	1.0002	0.9622	0.9639	0.0229	0.9217	1.0141	47.1	52.7
Incomb High inc. BB	174.5	0.00199431611	50	0.9984	0.9984	0.0005	0.9974	0.9993	0.9199	0.9194	0.0228	0.8743	0.9639	43.2	55.9

677. Predicted Project alone impacts on the puffin population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

678. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9977 (95% c.i. 0.9968-0.9986) (**Table 6-75**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.23%. This predicted small change to population growth rate indicates that the kittiwake population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of only 7 birds per annum to the in-combination total of 175 birds per annum (including Berwick Bank Wind Farm impacts, worst case scenario). The in-combination total excluding Berwick Bank Wind Farm impacts was 111 birds per annum, which resulted in a change in population growth rate of 0.15%, i.e. Berwick Bank Wind Farm impacts comprise a substantial proportion of the in-combination impacts.

679. The puffin population of the Farne Islands SPA is a named component of the breeding seabird assemblage feature and not a qualifying feature in its own right. Feature condition has not been assessed and no citation population size is provided[32]. Population size at this colony decreased by 21% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). Nevertheless, the puffin colony on the Farne Islands SPA remains the second largest colony in the UK (Burnell *et al.,* 2023). There is no evidence of puffin populations being impacted by the HPAI epidemic and no additional counts of puffins on the Farne Islands SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

680. Whilst the puffin population at the Farne Islands SPA has declined, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any future declines that might occur and will not prevent or reduce the potential for this population to be maintained or restored.

681. Consequently, a conclusion of no AEoSI was reached for the puffin feature of the Farne Islands SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.9.6 *Conclusions*

682. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Farne Islands SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

683. A conclusion of **no AEoSI** was reached for the **puffin** feature of the **Farne Islands SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

684. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake and puffin, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of

[32] *Designated Sites View (naturalengland.org.uk)*

no AEoSI was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Farne Islands SPA**.

685. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Farne Islands SPA** was reached.

6.3.10 Flamborough and Filey Coast SPA

6.3.10.1 Site Description

686. The Flamborough and Filey Coast SPA was classified in March 1993, with an update in September 2018, for its populations of breeding seabirds. The site is along the coastline of the counties of North Yorkshire and the East Riding of Yorkshire between Bridlington and Scarborough and is approximately 558 km south-east of the Project.

687. The Flamborough and Filey Coast SPA straddles the border of East Yorkshire and North Yorkshire at the western edge of the North Sea. It has two sections - Flamborough to the south, and Filey to the north - both encompassing clifftop, sea cliff and intertidal rock habitats and offshore to 2 km. It extends inland in the sections running from Cunstone Nab in the north to Carr Naze at the corner of Filey Brigg, then from the south of Filey Bay at Reighton to its southernmost point at Sewerby steps. The expanse of Filey Bay divides these two inland sections but is not included in the designation.

688. The site is highly protected both for its wildlife and unique chalk cliff habitats and the numerous ledges, crevices and caves provide ideal nesting and roosting sites for seabirds, supporting a colony of national and international importance, currently the largest mainland seabird colony in England. The SPA supports the only mainland gannetry in England, the largest kittiwake colony in the UK and the largest guillemot and razorbill colonies in England. The colonies are situated along the cliffs on the southern and northern sides of Filey Bay and the north and south sides of Flamborough Head. They support over 200,000 seabirds during the breeding season, many of which are extremely limited in breeding range throughout the UK. In addition to providing nest sites, the sheer cliffs also act as a deterrent to mammalian predators and provide a focal point for migrating seabirds.

689. The waters adjacent to the colonies are used by large numbers of seabirds for a wide range of activities, including bathing, preening, displaying, loafing and local foraging. The mixing of two distinct North Sea water bodies – the cooler, deeper, stratified waters of the northern North Sea and warmer, shallower, well-mixed waters of the southern North Sea - gives rise to the offshore frontal system known as the ‘Flamborough Front’. The resulting nutrient-rich waters and the presence of the Flamborough Front contribute to the diverse and unusual range of marine species found in the area and the increased productivity provides rich feeding ground for birds. Although most feeding occurs offshore, when conditions are favourable and food is abundant, large numbers of seabirds move into Filey Bay to feed.

6.3.10.2 Conservation Objectives for the SPA

690. The conservation objectives of the Flamborough and Filey Coast SPA are to:

- 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 Wild Birds Directive, by maintaining or restoring;
- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The population of each of the qualifying features, and
- The distribution of the qualifying features within the site.

691. Predicted impacts from the Project alone and in-combination have the potential to affect the conservation objective to maintain or restore the population of each qualifying feature. The other conservation objectives relate to the SPA itself. As the proposed Project does not overlap with the boundary of the SPA the other conservation objectives cannot be affected.

6.3.10.3 Qualifying features

692. The qualifying features of the SPA are presented below in **Table 6-76**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

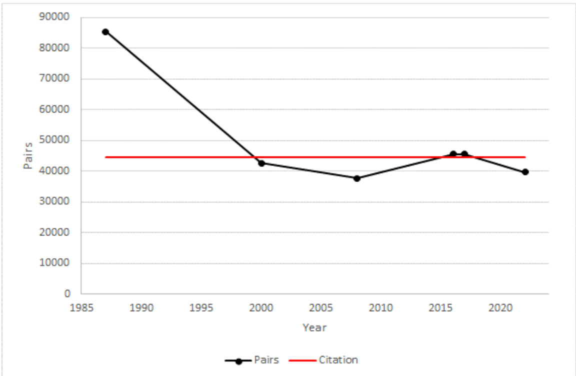
Table 6-76 Qualifying interests and condition for the Flamborough and Filey Coast SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake	44,520 pairs, 89,040 breeding adults (2008-2011). 2% North Atlantic	45,504 pairs	Not available	n/a	Red
Guillemot	41,607 pairs, 83,214 breeding adults (2008-2011). 15.6% (*Uria aalge albionis*)	84,647 individuals	Not available	n/a	Amber
Razorbill	10,570 pairs, 21,140 breeding adults (2008-2011). 2.3% (*Alca torda islandica*)	27,967 individuals	Not available	n/a	Amber
Gannet	8,469 pairs, 16,938 breeding adults (2008-2012). 2.6% North Atlantic	13,392 pairs	Not available	n/a	Amber
Northern Fulmar*	over 2,000 individuals	846 pairs	Not available	n/a	Amber
Seabird assemblage	supports an assemblage of more than 20,000	n/a	Not available	n/a	n/a

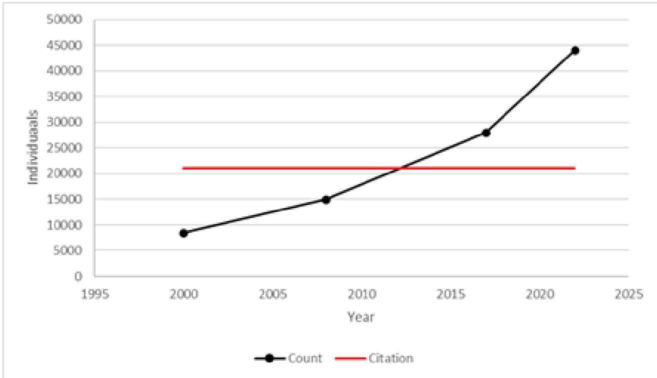
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
	individual breeding seabirds (average number of individuals: 216,730, 2008-2012)				

693. Flamborough and Filey Coast SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 300,000 seabirds including nationally important populations of the following species: black-legged kittiwake, common guillemot, razorbill, cormorant, great black-backed gull, herring gull, European shag and Northern fulmar.

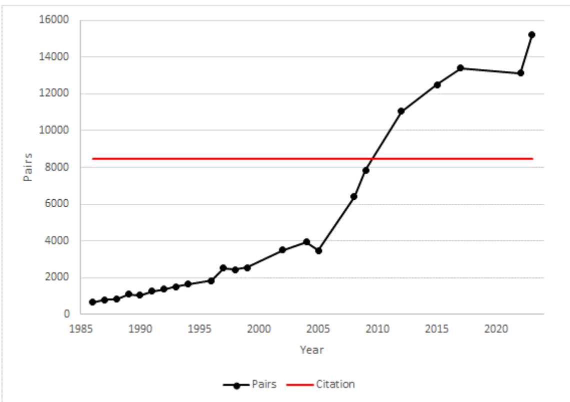
694. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) count data between 1986 and 2023 (the most recent count) was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-12**).



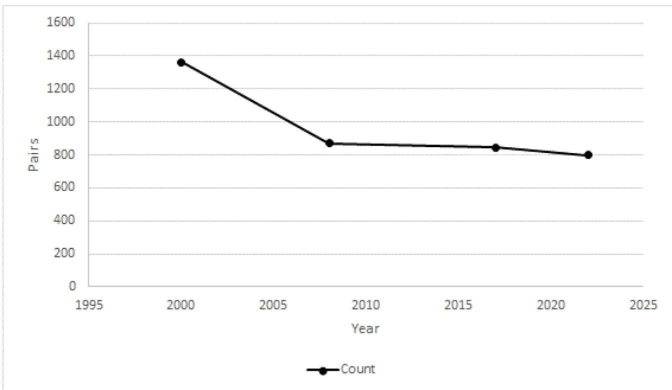
Kittiwake



Razorbill



Gannet



Fulmar

Figure 6-12. Flamborough and Filey Coast SPA qualifying feature population trends from 1986 - 2023 (citation population size shown by red line).

6.3.10.4 Potential for the Project to impact the site's conservation objectives

695. The Flamborough and Filey Coast SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **razorbill** qualifying feature, during the non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **gannet** qualifying feature, during the non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding seasons;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding seasons.

696. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

697. These predicted impacts have the potential to undermine the conservation objective:

- 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 Wild Birds Directive, by maintaining or restoring the population of each of the qualifying features.

698. As the site does is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.10.5 Assessment of predicted impacts for Project alone and in-combination

6.3.10.5.1 Kittiwake

699. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Flamborough and Filey Coast SPA population is presented in **Table 6-77**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-77. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities apportioned to the Flamborough and Filey Coast SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Non-breeding season (NatureScot)	2.46	0.40	2.46	1.17
Mortality - Autumn migration (BDMPS)	0.89	0.11	0.89	0.38
Mortality - Spring migration (BDMPS)	1.57	0.29	1.57	0.79
Annual Project alone mortality (collision + displacement)*	2.86		3.63	
Percentage point change in annual adult survival rate	<0.01%		<0.01%	
Annual in-combination mortality excl Berwick Bank	381.98		388.94	
Percentage point change in annual adult survival rate	0.42%		0.43%	
Annual in-combination mortality incl Berwick Bank	419.02		440.45	
Percentage point change in annual adult survival rate	0.46%		0.48%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

700. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

701. Change in adult survival rate due to in-combination impacts exceeded 0.02% threshold and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

702. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

703. **Table 6-78** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the kittiwake population at Flamborough and Filey Coast SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. Appendix 8

- HRA: PVA at SPA population scales for Project alone and in-combination impacts includes information on all inputs to this PVA and a plot showing population size over time.

704. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population

Table 6-78. Flamborough and Filey Coast SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	2.9	0.00003138136	25	1.0000	1.0000	0.0003	0.9993	1.0007	0.9995	0.9994	0.0089	0.9823	1.0183	50.0	50.0
Project alone CRM+High	3.6	0.00003989990	25	1.0000	1.0000	0.0003	0.9992	1.0006	0.9992	0.9991	0.0092	0.9802	1.0172	50.1	49.9
Incomb CRM+Low ex. BB	382.0	0.00419721583	25	0.9951	0.9950	0.0004	0.9943	0.9957	0.8787	0.8786	0.0082	0.8616	0.8942	35.8	63.6
Incomb CRM+High ex. BB	388.9	0.00427373611	25	0.9950	0.9950	0.0004	0.9942	0.9956	0.8771	0.8770	0.0082	0.8604	0.8930	35.7	63.7
Incomb CRM+Low inc. BB	419.0	0.00460415831	25	0.9946	0.9946	0.0004	0.9939	0.9953	0.8677	0.8678	0.0081	0.8524	0.8838	34.2	64.7
Incomb CRM+High inc. BB	440.5	0.00483972664	25	0.9943	0.9943	0.0003	0.9936	0.9950	0.8615	0.8615	0.0081	0.8451	0.8776	34.0	65.4
Project alone CRM+Low	2.9	0.00003138136	35	1.0000	1.0000	0.0003	0.9995	1.0005	0.9988	0.9991	0.0102	0.9795	1.0195	50.4	49.9
Project alone CRM+High	3.6	0.00003989990	35	1.0000	1.0000	0.0003	0.9994	1.0005	0.9984	0.9987	0.0110	0.9778	1.0204	49.9	50.2
Incomb CRM+Low ex. BB	382.0	0.00419721583	35	0.9951	0.9950	0.0003	0.9944	0.9956	0.8364	0.8362	0.0095	0.8170	0.8549	35.7	64.4
Incomb CRM+High ex. BB	388.9	0.00427373611	35	0.9950	0.9950	0.0003	0.9943	0.9956	0.8338	0.8338	0.0092	0.8156	0.8517	35.3	64.4
Incomb CRM+Low inc. BB	419.0	0.00460415831	35	0.9946	0.9946	0.0003	0.9940	0.9952	0.8213	0.8218	0.0092	0.8037	0.8405	34.4	65.4
Incomb CRM+High inc. BB	440.5	0.00483972664	35	0.9943	0.9943	0.0003	0.9937	0.9949	0.8138	0.8136	0.0095	0.7946	0.8321	33.5	66.3
Project alone CRM+Low	2.9	0.00003138136	50	1.0000	1.0000	0.0002	0.9995	1.0004	0.9993	0.9993	0.0126	0.9735	1.0230	49.9	50.1
Project alone CRM+High	3.6	0.00003989990	50	1.0000	1.0000	0.0003	0.9995	1.0004	0.9990	0.9987	0.0135	0.9724	1.0246	49.9	50.1
Incomb CRM+Low ex. BB	382.0	0.00419721583	50	0.9965	0.9965	0.0003	0.9960	0.9970	0.8369	0.8365	0.0117	0.8148	0.8592	36.3	63.2
Incomb CRM+High ex. BB	388.9	0.00427373611	50	0.9964	0.9964	0.0003	0.9959	0.9970	0.8334	0.8339	0.0113	0.8113	0.8560	36.0	63.3
Incomb CRM+Low inc. BB	419.0	0.00460415831	50	0.9962	0.9962	0.0003	0.9956	0.9967	0.8215	0.8216	0.0110	0.8010	0.8437	35.1	64.4
Incomb CRM+High inc. BB	440.5	0.00483972664	50	0.9960	0.9960	0.0003	0.9954	0.9965	0.8131	0.8135	0.0113	0.7909	0.8344	34.5	65.1

705. Predicted Project alone impacts on the kittiwake population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

706. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9943 (95% c.i. 0.9937-0.9949) (**Table 6-78**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.57%. This predicted small change to population growth rate indicates that the kittiwake population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of <4 birds per annum to the in-combination total of 441 birds per annum (including Berwick Bank impacts, worst case scenario). The in-combination total mortality excluding Berwick Bank Wind Farm impacts was 389 birds per annum, which resulted in a change in population growth rate of 0.5%.

707. The kittiwake population of the Flamborough and Filey Coast SPA has a citation population size of 44,520 pairs. Population size at this colony increased slightly by 7% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023) and the population remains above citation population size. The Flamborough and Filey Coast SPA kittiwake population is the largest kittiwake colony in the UK (Burnell *et al.*, 2023). Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The Flamborough and Filey Coast SPA kittiwake population was not counted in 2023 to assess the consequences of any HPAI impacts, so any change in population size due to HPAI is unknown. While some kittiwake colonies showed a decline in 2023, some showed an increase in population size (Tremlett *et al.*, 2024). Consequently, it is not possible to predict whether the Flamborough and Filey Coast SPA kittiwake population has remained stable or decreased due to HPAI impacts.

708. The kittiwake population at Flamborough and Filey Coast SPA has been stable or slightly increasing. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any future declines and will not prevent or reduce the potential for this population to be maintained.

709. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the Flamborough and Filey Coast SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.10.5.2 Razorbill

710. Predicted razorbill displacement mortality, by season, and change to annual adult survival rate apportioned to the Flamborough and Filey Coast SPA population is presented in **Table 6-79**.

711. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-79. Estimated adult razorbill Project alone and in-combination displacement seasonal and annual mortalities apportioned to Flamborough and Filey Coast SPA and change in baseline annual adult survival rate.

***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

RAZORBILL	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.07	0.14
Mortality - Autumn migration (BDMPS)	0.03	0.07
Mortality - Winter (BDMPS)	0.00	0.00
Mortality - Spring migration (BDMPS)	0.03	0.07
Annual Project mortality alone* (displacement	0.07	0.14
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination mortality excl. Berwick Bank	59.77	126.71
Percentage point change in annual adult survival rate	0.16%	0.34%
Annual in-combination mortality incl. Berwick Bank	63.30	137.33
Percentage point change in annual adult survival rate	0.17%	0.37%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

712. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

713. Change in adult survival rate due to in-combination impacts did exceed 0.02%, but as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

714. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this feature to be maintained.

715. Consequently, a conclusion of no AEoSI was reached for the razorbill feature of the Flamborough and Filey Coast SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.10.5.3 Gannet

716. Predicted gannet collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Flamborough and Filey Coast SPA population is presented in **Table 6-80**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

717. Note, almost all breeding season Project alone gannet mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-80. Estimated adult gannet Project alone and in-combination collision and displacement seasonal and annual mortalities apportioned to the Flamborough and Filey Coast SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

GANNET	Collision (WCS)	Low Displacement (70%/1%)	Collision (WCS)	High Displacement (70%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.50	0.53	0.50	1.58
Mortality - Autumn migration (BDMPS)	0.39	0.46	0.39	1.39
Mortality - Spring migration (BDMPS)	0.11	0.06	0.11	0.18
Annual Project alone mortality (collision + displacement)*	1.02		2.07	
Percentage point change in annual adult survival rate	0.004%		0.008%	
Annual in-combination mortality excl Berwick Bank	204.67		270.07	
Percentage point change in annual adult survival rate	0.76%		1.01%	
Annual in-combination mortality incl Berwick Bank	206.87		272.16	
Percentage point change in annual adult survival rate	0.77%		1.02%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

718. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

719. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

720. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

721. **Table 6-81** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the gannet population at Flamborough and Filey Coast SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

722. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-81. Flamborough and Filey Coast SPA: Gannet PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50^{th} centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	1.0	0.00003818383	25	1.0000	0.9999	0.0005	0.9990	1.0009	0.9983	0.9982	0.0132	0.9726	1.0243	49.4	50.9
Project alone CRM+High	2.1	0.00007739663	25	0.9999	0.9999	0.0005	0.9989	1.0009	0.9970	0.9973	0.0131	0.9719	1.0240	49.3	50.7
Incomb CRM+Low ex. BB	204.8	0.00764523392	25	0.9910	0.9910	0.0005	0.9901	0.9920	0.7912	0.7913	0.0105	0.7701	0.8118	9.7	91.7
Incomb CRM+High ex. BB	270.1	0.01008318458	25	0.9882	0.9882	0.0005	0.9871	0.9892	0.7344	0.7341	0.0104	0.7140	0.7550	4.4	96.8
Incomb CRM+Low inc. BB	206.9	0.00772350098	25	0.9910	0.9910	0.0005	0.9900	0.9919	0.7894	0.7898	0.0107	0.7703	0.8117	9.6	92.4
Incomb CRM+High inc. BB	272.2	0.01016145164	25	0.9881	0.9881	0.0005	0.9869	0.9891	0.7328	0.7323	0.0104	0.7119	0.7522	4.4	97.0
Project alone CRM+Low	1.0	0.00003818383	35	1.0000	1.0000	0.0004	0.9991	1.0007	0.9983	0.9981	0.0150	0.9697	1.0276	49.1	50.4
Project alone CRM+High	2.1	0.00007739663	35	0.9999	0.9999	0.0004	0.9991	1.0008	0.9962	0.9964	0.0152	0.9694	1.0291	48.9	51.0
Incomb CRM+Low ex. BB	204.8	0.00764523392	35	0.9910	0.9910	0.0004	0.9901	0.9919	0.7231	0.7228	0.0116	0.6990	0.7452	6.2	94.2
Incomb CRM+High ex. BB	270.1	0.01008318458	35	0.9882	0.9882	0.0004	0.9873	0.9890	0.6510	0.6512	0.0108	0.6298	0.6720	2.0	98.5
Incomb CRM+Low inc. BB	206.9	0.00772350098	35	0.9909	0.9909	0.0004	0.9901	0.9917	0.7208	0.7206	0.0114	0.6981	0.7420	6.2	94.7
Incomb CRM+High inc. BB	272.2	0.01016145164	35	0.9881	0.9881	0.0005	0.9871	0.9889	0.6495	0.6494	0.0108	0.6280	0.6700	2.0	98.5
Project alone CRM+Low	1.0	0.00003818383	50	1.0000	1.0000	0.0003	0.9992	1.0006	0.9981	0.9978	0.0180	0.9606	1.0337	49.4	50.3
Project alone CRM+High	2.1	0.00007739663	50	0.9999	0.9999	0.0003	0.9993	1.0007	0.9960	0.9964	0.0180	0.9629	1.0342	49.6	50.6
Incomb CRM+Low ex. BB	204.8	0.00764523392	50	0.9936	0.9936	0.0004	0.9929	0.9943	0.7215	0.7209	0.0134	0.6947	0.7466	9.0	90.6
Incomb CRM+High ex. BB	270.1	0.01008318458	50	0.9916	0.9916	0.0004	0.9908	0.9923	0.6494	0.6494	0.0123	0.6245	0.6730	4.5	95.6
Incomb CRM+Low inc. BB	206.9	0.00772350098	50	0.9936	0.9935	0.0004	0.9928	0.9942	0.7190	0.7189	0.0133	0.6921	0.7445	8.9	91.4
Incomb CRM+High inc. BB	272.2	0.01016145164	50	0.9915	0.9915	0.0004	0.9908	0.9922	0.6477	0.6472	0.0125	0.6223	0.6707	4.4	95.8

723. Predicted Project alone impacts on the gannet population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

724. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9881 (95% c.i. 0.9871-0.9889) (**Table 6-81**). The predicted reduction in population growth rate under this highest impact worst case scenario was 1.2%. This predicted small change to population growth rate indicates that the gannet population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of only 2 birds per annum to the in-combination total of 272 birds per annum (including Berwick Bank impacts, worst case scenario).

725. The gannet feature of the Flamborough and Filey Coast SPA has increased substantially. Population size at this colony increased by 240% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). Gannet populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). However, counts of gannets at the Flamborough and Filey Coast SPA found an increase in population size (+14%) compared to the previous count (Seabirds Count), giving a recent population estimate of 15,233 AOS/AON (Tremlett *et al.*, 2024).

726. The gannet population at the Flamborough and Filey Coast SPA has sustained an increase across many years and has potential to increase further[33]. There is no evidence of this population being impacted by HPAI. Project alone impacts on this population are very small, with an estimated annual mortality of only 2 birds per annum. In-combination impacts are larger, with a predicted decrease in population growth rate of up to 1.2%. However, given the potential for the colony to continue to growth, in-combination impacts will not prevent or reduce the potential for this feature to be maintained.

727. Consequently, a conclusion of no AEoSI was reached for the gannet feature of the Flamborough and Filey Coast SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.10.5.4 Fulmar

728. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the Flamborough and Filey Coast SPA population is presented in **Table 6-82**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features.

[33] *Marine site detail (naturalengland.org.uk)*

Table 6-82. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities (birds per annum) apportioned to the Flamborough and Filey Coast SPA and change in baseline annual adult survival rate

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.000	0.000
Mortality - Non-breeding season (NatureScot)	0.023	0.069
Mortality - Autumn migration (BDMPS)	0.009	0.027
Mortality - Winter (BDMPS)	0.004	0.011
Mortality - Spring migration (BDMPS)	0.011	0.032
Annual Project alone* (displacement)	0.023	0.069
Percentage point change in annual adult survival rate	0.001%	0.004%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

729. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination assessment was undertaken for fulmar.

730. The very small predicted mortality from Project impacts on this population will not prevent or reduce the potential for this feature to be restored.

731. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the Flamborough and Filey Coast SPA, from displacement and barrier impacts from the Project alone. No in-combination assessment was undertaken for fulmar.

6.3.10.6 Conclusions

732. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Flamborough and Filey Coast SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

733. A conclusion of **no AEoSI** was reached for the **razorbill** feature of the **Flamborough and Filey Coast SPA,** from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

734. A conclusion of **no AEoSI** was reached for the **gannet** feature of the **Flamborough and Filey Coast SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

735. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Flamborough and Filey Coast SPA**, from displacement impacts from the **Project alone.**

736. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, razorbill, gannet and fulmar, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Flamborough and Filey Coast SPA**.

737. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Flamborough and Filey Coast SPA** was reached.

6.3.11 Forth Islands SPA

6.3.11.1 Site Description

738. The Forth Islands SPA was classified on 25 April 1990; extended 16 February 2004, marine extension classified on 25 September 2009, due to the populations of breeding seabirds. The site is approximately 302 km south-east of the Project.

739. 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 2 km into the marine environment to include the seabed, water column and surface. The boundary of the SPA overlaps with the boundaries of the following Sites of Special Scientific Interest: Long Craig, Inchmickery, Forth Islands, Bass Rock and the Isle of May. A small overlap also occurs with the Firth of Forth SPA.

740. The foraging seabirds from the Forth Islands SPA are also supported by a marine SPA, the Outer Firth of Forth and St Andrews Bay Complex SPA. Consequently, the marine SPA is functionally linked to the Forth Islands SPA.

6.3.11.2 Conservation Objectives for the SPA

741. The conservation objectives of the Forth Islands SPA are to:

- 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
- 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.

6.3.11.3 Qualifying features

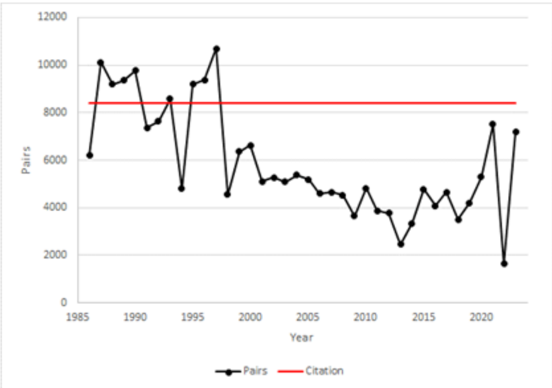
742. The qualifying features of the SPA are presented below in **Table 6-83**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

Table 6-83. Qualifying interests and condition for the Forth Islands SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

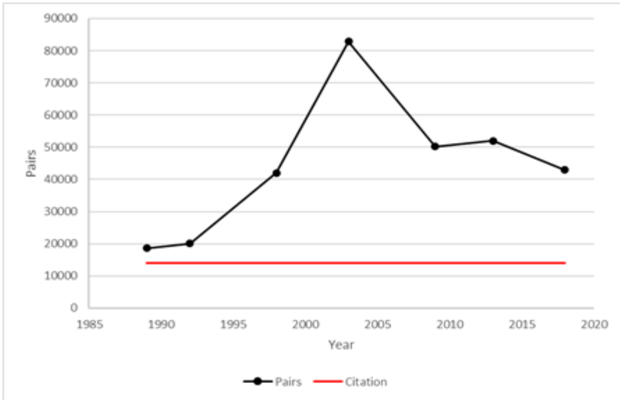
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake*	8,400 pairs, 1.7% of the GB population	4,542 pairs	Unfavourable No change	1 June 2021	Red
Herring gull*	6,600 pairs, 4.1% of the GB population	5,822 pairs	Favourable Maintained	1 June 2021	Red
Lesser black-backed gull	1,500 pairs, 1.2% of total L.f. graellsii biogeographic population	2,015 pairs	Favourable Maintained	1 June 2021	Amber
Guillemot*	16,000 pairs, 2.2% of the GB population	26,510 individuals	Favourable Maintained	1 June 2021	Amber
Razorbill*	1,400 pairs, 1.4% of the GB population	5,695 individuals	Favourable Maintained	1 June 2019	Amber
Puffin	14,000 pairs, 1.5% of the total *F.a.grabae* biogeographic population	42,923 pairs	Favourable Maintained	1 June 2020	Red
Gannet	21,600 pairs, 8.2% of the world biogeographic population	75,259 pairs	Favourable Maintained	23 June 2014	Amber
Cormorant*	200 pairs, 2.8% of the GB population	106 pairs	Unfavourable No change	1 June 2021	Green
Shag	2,400 pairs, 1.9% of the N Europe biogeographic population	746 pairs	Unfavourable No change	1 June 2021	Red
Arctic tern	Mean between 1992 and 1996 of 540 pairs, 1.2% of the GB population	832 pairs	Favourable Maintained	1 June 2021	Amber
Common tern	mean between 1997 and 2001 of 334 pairs, 3% of the GB population	112 pairs	Unfavourable No change	1 June 2021	Amber
Roseate tern	mean between 1997 and 2001 of 8 pairs, 13% of the GB population	n/a	Unfavourable No change	1 June 2021	Red
Sandwich tern	an average of 440 pairs, 3% of the GB population	0 pairs	Unfavourable No change	1 June 2021	Anber
Seabird assemblage	regularly supports 90,000 seabirds (three year mean, 1986 – 1988) including nationally important populations	n/a	Favourable Declining	30 June 2016	n/a

743. Forth Islands SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 90,000 seabirds including nationally important populations of the following species: black-legged kittiwake, Atlantic puffin, Arctic tern, common tern, roseate tern, Sandwich tern, common guillemot, razorbill, herring gull, lesser black-backed gull, European shag, cormorant and Northern gannet.

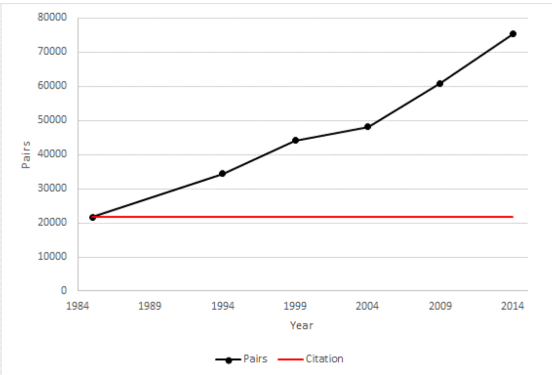
744. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) count data between 1985 and 2023 (the most recent count) was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-13**).



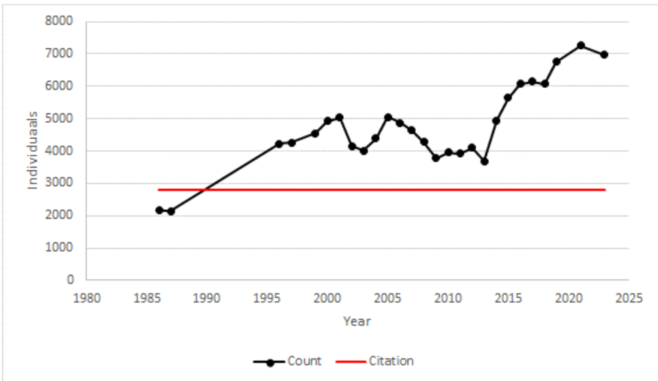
Kittiwake



Puffin



Gannet



Razorbill

Figure 6-13. Forth Islands SPA qualifying feature population trends from 1985 - 2014 (citation population size shown by red line).

6.3.11.4 *Potential for the Project to impact the site's conservation objectives*

745. The Forth Islands SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **razorbill** qualifying feature, during the non-breeding season;
- Displacement impacts from the offshore Project during operation on the **puffin** qualifying feature, during the non-breeding season;

- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **gannet** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

746. The site is functionally linked to the Outer Firth of Forth and St Andrews Bay Complex SPA, with breeding birds from the Forth Islands SPA colonies using the marine SPA. Vessels transiting between the offshore Project and the Ports of Dundee and Leith will pass through the marine SPA so any disturbance/displacement of birds while foraging in the marine SPA could have a knock-on effect for the colony SPA. However, the breeding seabird features of this SPA are generally not particularly sensitive to vessels and so this particular impact pathway was screened out for these features. The wintering waterfowl features of the Outer Firth of Forth and St Andrews Bay Complex SPA, which do not have any functional connectivity with the Forth Islands SPA, could be affected by vessel presence and this is assessed separately under the SPA account for the marine SPA.

747. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

748. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

749. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.11.5 Assessment of predicted impacts for Project alone and in-combination

750. An in-combination assessment was undertaken that collated quantitative information on impacts to features of this SPA from published consent applications. Other reasonably foreseeable projects which have not yet submitted an application may also impact some of the qualifying features of this site. MD-LOT advised (by email, 10 June 2024) that a qualitative assessment of OWF projects for which a Scoping Opinion has been adopted should be undertaken.

751. OWF projects for which a Scoping Opinion has been adopted and which identified possible impacts from their project on the Forth Islands SPA, in their Scoping Reports, are listed in **Table 6-84**.

Table 6-84 In-combination project with the potential to impact the Forth Islands SPA that have not yet submitted an application. Only features which could be impacted by Project impacts are listed

SPA qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Atlantic puffin				Y	Y	
Black-legged kittiwake				Y	Y	Y
Northern gannet				Y	Y	Y
Razorbill				Y	Y	Y

752. The predicted impacts from these projects have not been considered in the quantitative assessment of the impacts from the Project in-combination with other reasonably foreseeable projects, as it is assumed that these projects will need to consider this Project in their in-combination assessments.

6.3.11.5.1 Kittiwake

753. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Forth Islands SPA population is presented in **Table 6-85**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-85. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the Forth Islands SPA and change in baseline annual adult survival rate.
***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination** impacts for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.02	0.00	0.02	0.01
Mortality - Non-breeding season (NatureScot)	0.20	0.03	0.20	0.10
Mortality - Autumn migration (BDMPS)	0.07	0.01	0.07	0.03
Mortality - Spring migration (BDMPS)	0.13	0.02	0.13	0.07
Annual Project alone mortality (collision + displacement)*	0.26		0.33	
Percentage point change in annual adult survival rate	<0.01%		<0.01%	
Annual in-combination mortality excl Berwick Bank	23.84		32.56	
Percentage point change in annual adult survival rate	0.26%		0.36%	
Annual in-combination mortality incl Berwick Bank	49.06		65.14	
Percentage point change in annual adult survival rate	0.54%		0.72%	

MacArthur Green

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.*

754. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

755. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

756. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts

757. **Table 6-86** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the kittiwake population at Forth Islands SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

758. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-86. Forth Islands SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	0.3	0.00002872189	25	1.0001	1.0000	0.0011	0.9978	1.0021	1.0021	1.0016	0.0287	0.9454	1.0593	50.5	49.7
Project alone CRM+High	0.3	0.00003669887	25	1.0000	1.0000	0.0011	0.9979	1.0023	1.0003	1.0010	0.0299	0.9443	1.0652	50.7	49.3
Incomb CRM+Low ex. BB	23.8	0.00262408474	25	0.9970	0.9969	0.0011	0.9948	0.9989	0.9237	0.9235	0.0261	0.8719	0.9752	41.1	58.9
Incomb CRM+High ex. BB	32.6	0.00358386301	25	0.9958	0.9958	0.0011	0.9937	0.9980	0.8970	0.8971	0.0265	0.8482	0.9526	38.2	61.3
Incomb CRM+Low inc. BB	49.1	0.00540056320	25	0.9937	0.9937	0.0011	0.9915	0.9958	0.8473	0.8478	0.0254	0.8014	0.8986	33.0	67.5
Incomb CRM+High inc. BB	65.1	0.00717135497	25	0.9916	0.9916	0.0011	0.9893	0.9936	0.8023	0.8027	0.0236	0.7532	0.8481	29.5	71.8
Project alone CRM+Low	0.3	0.00002872189	35	1.0000	1.0000	0.0009	0.9983	1.0019	1.0011	1.0019	0.0344	0.9366	1.0695	50.0	50.1
Project alone CRM+High	0.3	0.00003669887	35	1.0000	1.0000	0.0010	0.9981	1.0018	1.0004	1.0011	0.0347	0.9358	1.0696	50.5	49.6
Incomb CRM+Low ex. BB	23.8	0.00262408474	35	0.9969	0.9969	0.0009	0.9950	0.9987	0.8936	0.8947	0.0299	0.8356	0.9524	40.8	58.7
Incomb CRM+High ex. BB	32.6	0.00358386301	35	0.9958	0.9958	0.0010	0.9938	0.9977	0.8593	0.8594	0.0315	0.7976	0.9222	37.4	62.1
Incomb CRM+Low inc. BB	49.1	0.00540056320	35	0.9937	0.9937	0.0010	0.9917	0.9957	0.7955	0.7961	0.0290	0.7389	0.8547	31.1	67.2
Incomb CRM+High inc. BB	65.1	0.00717135497	35	0.9916	0.9916	0.0010	0.9895	0.9933	0.7375	0.7376	0.0259	0.6868	0.7867	25.6	73.0
Project alone CRM+Low	0.3	0.00002872189	50	1.0000	1.0000	0.0008	0.9984	1.0017	1.0012	1.0016	0.0425	0.9237	1.0908	50.1	49.9
Project alone CRM+High	0.3	0.00003669887	50	1.0000	1.0000	0.0008	0.9985	1.0016	1.0005	1.0016	0.0406	0.9254	1.0852	50.2	49.9
Incomb CRM+Low ex. BB	23.8	0.00262408474	50	0.9978	0.9978	0.0008	0.9962	0.9995	0.8928	0.8944	0.0361	0.8232	0.9714	41.0	59.0
Incomb CRM+High ex. BB	32.6	0.00358386301	50	0.9970	0.9970	0.0008	0.9953	0.9986	0.8582	0.8588	0.0378	0.7868	0.9321	38.2	61.1
Incomb CRM+Low inc. BB	49.1	0.00540056320	50	0.9955	0.9955	0.0009	0.9938	0.9971	0.7970	0.7961	0.0358	0.7253	0.8652	32.7	66.4
Incomb CRM+High inc. BB	65.1	0.00717135497	50	0.9940	0.9940	0.0008	0.9925	0.9956	0.7357	0.7376	0.0322	0.6793	0.8017	28.6	71.4

759. Predicted Project alone impacts on the kittiwake population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

760. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9916 (95% c.i. 0.9895-0.9933) (**Table 6-86**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.84%. This predicted small change to population growth rate indicates that the kittiwake population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of only 0.33 birds per annum to the in-combination total of 65 birds per annum (including Berwick Bank Wind Farm impacts, worst case scenario). The in-combination total excluding Berwick Bank Wind Farm impacts was 33 birds per annum, which resulted in a change in population growth rate of 0.42%, i.e. Berwick Bank Wind Farm impacts comprise a substantial proportion of the in-combination impacts.

761. The kittiwake feature condition was Unfavourable No Change, when last assessed in June 2021. Population size at this colony decreased by 22% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The Forth Islands SPA kittiwake population had decreased by 29% when counted in 2023, compared with the Seabirds Count estimate, suggesting this population had been impacted by HPAI (Tremlett *et al.*, 2024).

762. The kittiwake population at the Forth Islands SPA is substantially smaller than citation population size and appears to have declined further due to HPAI impacts. Project alone and impacts on this population are very small. In-combination impacts were larger and have the potential to slightly reduce population size, but the Project contribution to this is very small, with a predicted mortality of only 0.33 birds per annum.

763. The predicted impacts from the Project alone and in-combination are predicted to be sufficiently small to not further exacerbate any declines and will not prevent or reduce the potential for this population to recover.

764. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the Forth Islands SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.11.5.2 Razorbill

765. Predicted razorbill displacement mortality, by season, and change to annual adult survival rate apportioned to the Forth Islands SPA population is presented in **Table 6-87**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-87. Estimated adult razorbill Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the Forth Islands SPA and change in baseline annual adult survival rate.

See ***Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts*** *for more details on calculation of mortalities and changes to survival rate.*

RAZORBILL	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.02	0.04
Mortality - Autumn migration (BDMPS)	0.01	0.02
Mortality - Winter (BDMPS)	0.00	0.00
Mortality - Spring migration (BDMPS)	0.01	0.02
Annual Project alone mortality* (displacement)	0.02	0.04
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination mortality excl Berwick Bank	28.77	55.20
Percentage point change in annual adult survival rate	0.38%	0.72%
Annual in-combination mortality incl Berwick Bank	41.66	77.81
Percentage point change in annual adult survival rate	0.55%	1.02%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

766. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

767. Change in adult survival rate due to in-combination impacts did exceed 0.02%, but as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

768. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this feature to be maintained.

769. Consequently, a conclusion of no AEoSI was reached for the razorbill feature of the Forth Islands SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.11.5.3 Puffin

770. Predicted puffin displacement mortality, by season, and change to annual adult survival rate apportioned to the Forth Islands SPA population is presented in **Table 6-88**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

771. Note, almost all breeding season Project alone puffin mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-88. Estimated adult puffin Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the Forth Islands SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate*

PUFFIN	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	3.44	10.31
Mortality - Non-breeding season (BDMPS)	3.44	10.31
Annual Project alone mortality* (Displacement)	3.44	10.31
Percentage point change in annual adult survival rate	<0.01%	0.01%
Annual in-combination excl Berwick Bank	143.05	293.88
Percentage point change in annual adult survival rate	0.17%	0.34%
Annual in-combination incl Berwick Bank	172.87	362.67
Percentage point change in annual adult survival rate	0.20%	0.42%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

772. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

773. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

774. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts

775. **Table 6-89** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the puffin population at the Forth Islands SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

776. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-89. Forth Islands SPA: Puffin PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	3.4	0.00004005082	25	1.0000	0.9999	0.0005	0.9990	1.0008	0.9987	0.9986	0.0120	0.9736	1.0216	50.0	49.9
Project alone High	10.3	0.00012015246	25	0.9999	0.9999	0.0004	0.9990	1.0007	0.9961	0.9964	0.0118	0.9737	1.0185	49.8	50.3
Incomb Low ex. BB	143.1	0.00166636665	25	0.9981	0.9981	0.0005	0.9972	0.9989	0.9510	0.9508	0.0114	0.9273	0.9735	44.8	54.7
Incomb High ex. BB	293.9	0.00342334371	25	0.9960	0.9960	0.0005	0.9951	0.9969	0.9016	0.9015	0.0109	0.8814	0.9243	40.3	59.1
Incomb Low inc. BB	172.9	0.00201374444	25	0.9977	0.9976	0.0005	0.9967	0.9985	0.9405	0.9405	0.0115	0.9171	0.9641	44.0	55.3
Incomb High inc. BB	362.7	0.00422462163	25	0.9951	0.9951	0.0005	0.9941	0.9960	0.8801	0.8799	0.0111	0.8578	0.9018	38.3	61.3
Project alone Low	3.4	0.00004005082	35	1.0000	1.0000	0.0005	0.9990	1.0009	0.9984	0.9984	0.0166	0.9662	1.0314	50.2	49.4
Project alone High	10.3	0.00012015246	35	0.9999	0.9999	0.0005	0.9989	1.0008	0.9954	0.9954	0.0165	0.9620	1.0272	49.7	50.1
Incomb Low ex. BB	143.1	0.00166636665	35	0.9981	0.9981	0.0005	0.9972	0.9989	0.9327	0.9323	0.0154	0.9016	0.9628	43.2	54.4
Incomb High ex. BB	293.9	0.00342334371	35	0.9960	0.9960	0.0005	0.9951	0.9969	0.8664	0.8664	0.0145	0.8375	0.8952	37.0	59.7
Incomb Low inc. BB	172.9	0.00201374444	35	0.9976	0.9976	0.0004	0.9968	0.9986	0.9187	0.9189	0.0151	0.8898	0.9488	41.0	55.5
Incomb High inc. BB	362.7	0.00422462163	35	0.9951	0.9951	0.0005	0.9941	0.9960	0.8378	0.8374	0.0146	0.8063	0.8654	35.1	62.2
Project alone Low	3.4	0.00004005082	50	0.9999	0.9999	0.0005	0.9990	1.0009	0.9968	0.9973	0.0244	0.9497	1.0473	49.4	50.2
Project alone High	10.3	0.00012015246	50	0.9999	0.9999	0.0005	0.9989	1.0008	0.9943	0.9940	0.0244	0.9431	1.0426	49.0	50.4
Incomb Low ex. BB	143.1	0.00166636665	50	0.9986	0.9986	0.0005	0.9977	0.9995	0.9302	0.9312	0.0228	0.8867	0.9767	44.1	54.1
Incomb High ex. BB	293.9	0.00342334371	50	0.9972	0.9971	0.0005	0.9961	0.9981	0.8653	0.8648	0.0218	0.8190	0.9078	39.4	59.3
Incomb Low inc. BB	172.9	0.00201374444	50	0.9983	0.9983	0.0005	0.9974	0.9994	0.9179	0.9185	0.0232	0.8762	0.9703	42.4	55.1
Incomb High inc. BB	362.7	0.00422462163	50	0.9965	0.9965	0.0005	0.9954	0.9974	0.8358	0.8363	0.0221	0.7922	0.8792	36.7	61.9

777. Predicted Project alone impacts on the puffin population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9951 (95% c.i. 0.9941-0.9960) (**Table 6-89**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.49%. This predicted small change to population growth rate indicates that the puffin population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of 10 birds per annum to the in-combination total of 363 birds per annum (including Berwick Bank impacts, worst case scenario).

778. The puffin feature was Favourable Maintained, when last assessed in June 2020. Population size at this colony decreased by 40% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023) but remains well above citation population size[34]. There is no evidence of puffin populations being impacted by the HPAI epidemic and no additional counts of puffins at Forth Islands SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

779. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any future declines that might occur and will not prevent or reduce the potential for this population to be restored.

780. Consequently, a conclusion of no AEoSI was reached for the puffin feature of the Forth Island SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.11.5.4 Gannet

781. Predicted gannet collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Forth Islands SPA population is presented in **Table 6-90.**

782. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

783. Note, almost all breeding season Project alone gannet mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

[34] SiteLink - Forth Islands SPA (nature.scot)

Table 6-90. Estimated adult gannet Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the Forth Islands SPA and change in baseline annual adult survival rate.
See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate*

GANNET	Collision (WCS)	Low Displacement (70%/1%)	Collision (WCS)	High Displacement (70%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Non-breeding season (NatureScot)	2.50	2.63	2.50	7.90
Mortality - Autumn migration (BDMPS)	1.95	2.33	1.95	6.99
Mortality - Spring migration (BDMPS)	0.55	0.31	0.55	0.92
Annual Project alone mortality (collision + displacement)*	5.13		10.40	
Percentage point change in annual adult survival rate	0.003%		0.007%	
Annual in-combination mortality excl. Berwick Bank	626.95		861.54	
Percentage point change in annual adult survival rate	0.42%		0.57%	
Annual in-combination mortality incl. Berwick Bank	711.18		945.77	
Percentage point change in annual adult survival rate	0.47%		0.63%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

784. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

785. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

786. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

787. **Table 6-91** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the gannet population at Forth Islands SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA**

population scales for Project alone and in-combination impacts includes information on all inputs to this PVA and a plot showing population size over time.

788. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-91. Forth Islands SPA: Gannet PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	5.1	0.00003408210	25	1.0000	1.0000	0.0002	0.9996	1.0004	0.9989	0.9990	0.0054	0.9881	1.0093	49.8	50.0
Project alone CRM+High	10.4	0.00006908252	25	0.9999	0.9999	0.0002	0.9995	1.0003	0.9978	0.9979	0.0054	0.9880	1.0090	49.3	50.6
Incomb CRM+Low ex. BB	626.9	0.00416525906	25	0.9951	0.9951	0.0002	0.9947	0.9956	0.8808	0.8808	0.0051	0.8713	0.8909	23.8	77.6
Incomb CRM+High ex. BB	861.5	0.00572381010	25	0.9933	0.9933	0.0002	0.9928	0.9937	0.8398	0.8395	0.0049	0.8298	0.8484	17.9	85.0
Incomb CRM+Low inc. BB	711.2	0.00472485357	25	0.9945	0.9945	0.0002	0.9940	0.9949	0.8662	0.8659	0.0050	0.8556	0.8752	21.3	80.7
Incomb CRM+High inc. BB	945.8	0.00628340461	25	0.9926	0.9926	0.0002	0.9922	0.9931	0.8255	0.8254	0.0050	0.8159	0.8353	15.8	87.1
Project alone CRM+Low	5.1	0.00003408210	35	1.0000	1.0000	0.0002	0.9996	1.0003	0.9987	0.9986	0.0061	0.9871	1.0111	49.4	50.5
Project alone CRM+High	10.4	0.00006908252	35	0.9999	0.9999	0.0002	0.9996	1.0003	0.9971	0.9971	0.0063	0.9850	1.0095	49.3	50.7
Incomb CRM+Low ex. BB	626.9	0.00416525906	35	0.9951	0.9951	0.0002	0.9948	0.9955	0.8384	0.8383	0.0057	0.8273	0.8493	19.0	79.0
Incomb CRM+High ex. BB	861.5	0.00572381010	35	0.9933	0.9933	0.0002	0.9929	0.9936	0.7848	0.7844	0.0054	0.7741	0.7941	12.3	89.1
Incomb CRM+Low inc. BB	711.2	0.00472485357	35	0.9944	0.9945	0.0002	0.9941	0.9948	0.8187	0.8186	0.0055	0.8079	0.8290	17.0	82.9
Incomb CRM+High inc. BB	945.8	0.00628340461	35	0.9926	0.9926	0.0002	0.9923	0.9930	0.7661	0.7660	0.0053	0.7555	0.7765	10.4	90.7
Project alone CRM+Low	5.1	0.00003408210	50	1.0000	1.0000	0.0001	0.9997	1.0003	0.9987	0.9987	0.0071	0.9843	1.0125	49.7	50.3
Project alone CRM+High	10.4	0.00006908252	50	0.9999	0.9999	0.0001	0.9997	1.0002	0.9969	0.9973	0.0075	0.9828	1.0126	49.1	51.0
Incomb CRM+Low ex. BB	626.9	0.00416525906	50	0.9965	0.9965	0.0002	0.9962	0.9968	0.8376	0.8374	0.0066	0.8241	0.8498	23.8	78.7
Incomb CRM+High ex. BB	861.5	0.00572381010	50	0.9952	0.9952	0.0002	0.9949	0.9955	0.7835	0.7832	0.0061	0.7707	0.7948	16.2	83.5
Incomb CRM+Low inc. BB	711.2	0.00472485357	50	0.9961	0.9961	0.0002	0.9958	0.9963	0.8177	0.8176	0.0064	0.8050	0.8299	20.8	80.4
Incomb CRM+High inc. BB	945.8	0.00628340461	50	0.9947	0.9948	0.0002	0.9945	0.9951	0.7646	0.7647	0.0061	0.7528	0.7773	13.8	85.6

789. Predicted Project alone impacts on the gannet population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9926 (95% c.i. 0.9923-0.9930) (**Table 6-91**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.74%. This predicted small change to population growth rate indicates that the gannet population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of 10 birds per annum to the in-combination total of 946 birds per annum (including Berwick Bank impacts, worst case scenario).

790. The gannet feature condition was Favourable Maintained, when last assessed in June 2014. The Bass Rock colony of the Forth Islands SPA is the largest colony in Scotland and has increased in size to well above the citation population size of 21,600 pairs[35]. Population size at this colony increased by 57% between the two seabird censuses, Seabird 2000 and Seabirds Count, to 75,259 AOS/AON (Burnell *et al.*, 2023). Gannet populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The Forth Islands SPA gannet colony was counted in 2023 and an estimated 55,000 AOS/AON was found (Tremlett *et al.*, 2024). Whilst this is a decrease from the previous gannet census, the population remains well above the citation population size. Recent evidence shows that gannets can acquire immunity to the disease (Lane *et al.*, 2023) and the population would be expected to show a rapid recovery.

791. The gannet population at Forth Islands SPA is expected to continue growing following the HPAI impacts on population size. As the Project alone and in-combination impacts on this population are predicted to be small they will not exacerbate any future declines which may occur and will not prevent or reduce the potential for this population to be maintained in the long-term.

792. Consequently, a conclusion of no AEoSI was reached for the gannet feature of the Forth Islands SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.11.6 Conclusions

793. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Forth Islands SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

794. A conclusion of **no AEoSI** was reached for the **razorbill** feature of the **Forth Islands SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

[35] *SiteLink - Forth Islands SPA (nature.scot)*

795. A conclusion of **no AEoSI** was reached for the **puffin** feature of the **Forth Islands SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

796. A conclusion of **no AEoSI** was reached for the **gannet** feature of the **Forth Islands SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

797. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, razorbill, puffin and gannet, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of the **Forth Islands SPA**.

798. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Forth Islands SPA** was reached.

6.3.12 Foula SPA

6.3.12.1 Site Description

799. The Foula SPA was classified on 27 November 1995, with marine extension classified on 25 September 2009, due to the populations of breeding seabirds. The site is approximately 161 km north of the Project.

800. Foula is the most westerly of the Shetland Islands which are situated to the north of the Scottish mainland and Orkney. It lies 20 km west of Shetland Mainland. Foula SPA consists of a rocky coastline, large areas of mire, and adjacent coastal waters which support internationally important breeding populations of seabirds. The boundary of the SPA overlaps with the boundary of Foula SSSI and Foula Coast SSSI, and the seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface.

6.3.12.2 Conservation Objectives for the SPA

801. The conservation objectives of the Foula SPA are to:

- 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
- 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.

6.3.12.3 Qualifying features

802. The qualifying features of the SPA are presented below in **Table 6-92**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

Table 6-92. Qualifying interests and condition for the Foula SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake* (breeding)	3,840 pairs, 0.8% of the GB population	425 pairs	Unfavourable Recovering	1 June 2021	Red
Arctic tern (breeding)	up to 1,500 pairs, 2% of GB	19 pairs	Unfavourable Declining	1 June 2018	Red
Great skua (breeding)	2,270 pairs, 17% of world biogeographic population	1,846 pairs	Unfavourable Declining	1 June 2023	Amber
Arctic skua* (breeding)	133 pairs, 4% of the GB population	19 pairs	Unfavourable Declining	1 June 2019	Red
Guillemot (breeding)	37,500 individuals, 0.8% of the North Atlantic biogeographic population	5,289 individuals	Unfavourable Declining	1 June 2021	Amber
Razorbill* (breeding)	6,200 individuals, 4% of the GB population	474 individuals	Unfavourable Recovering	1 June 2021	Amber
Puffin (breeding)	48,000 pairs, 5% of the total F.a.grabae biogeographic population	4,234 pairs	Unfavourable No change	6 May 2016	Red
Red-throated diver (breeding)	11 pairs in 1994, 1.2% of the GB population	n/a	Favourable Maintained	28 August 2013	Green
Leach's petrel (breeding)	50 pairs, <0.1% of the GB population	n/a	Unfavourable Declining	1 June 2021	Red
Fulmar* (breeding)	46,800 pairs, 9% of the GB population	10,253 pairs	Unfavourable No change	1 June 2021	Amber
Shag (breeding)	2,400 pairs, 1.9% of the North Europe biogeographic population	324 pairs	Unfavourable Recovering	1 June 2018	Red
Seabird assemblage (breeding)	regularly supports 250,000 seabirds including nationally important populations	n/a	Unfavourable Declining	1 June 2016	n/a

803. The Foula SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 250,000 seabirds including nationally important populations of the following species: black-legged kittiwake, razorbill, Arctic skua, Northern fulmar, Atlantic puffin, common guillemot, great skua, European shag, Leach's storm-petrel and Arctic tern.

804. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) colony count data from the period 1986 to 2023 was extracted from the SMP database. These counts were plotted and compared with the citation population size (**Figure 6-14**).

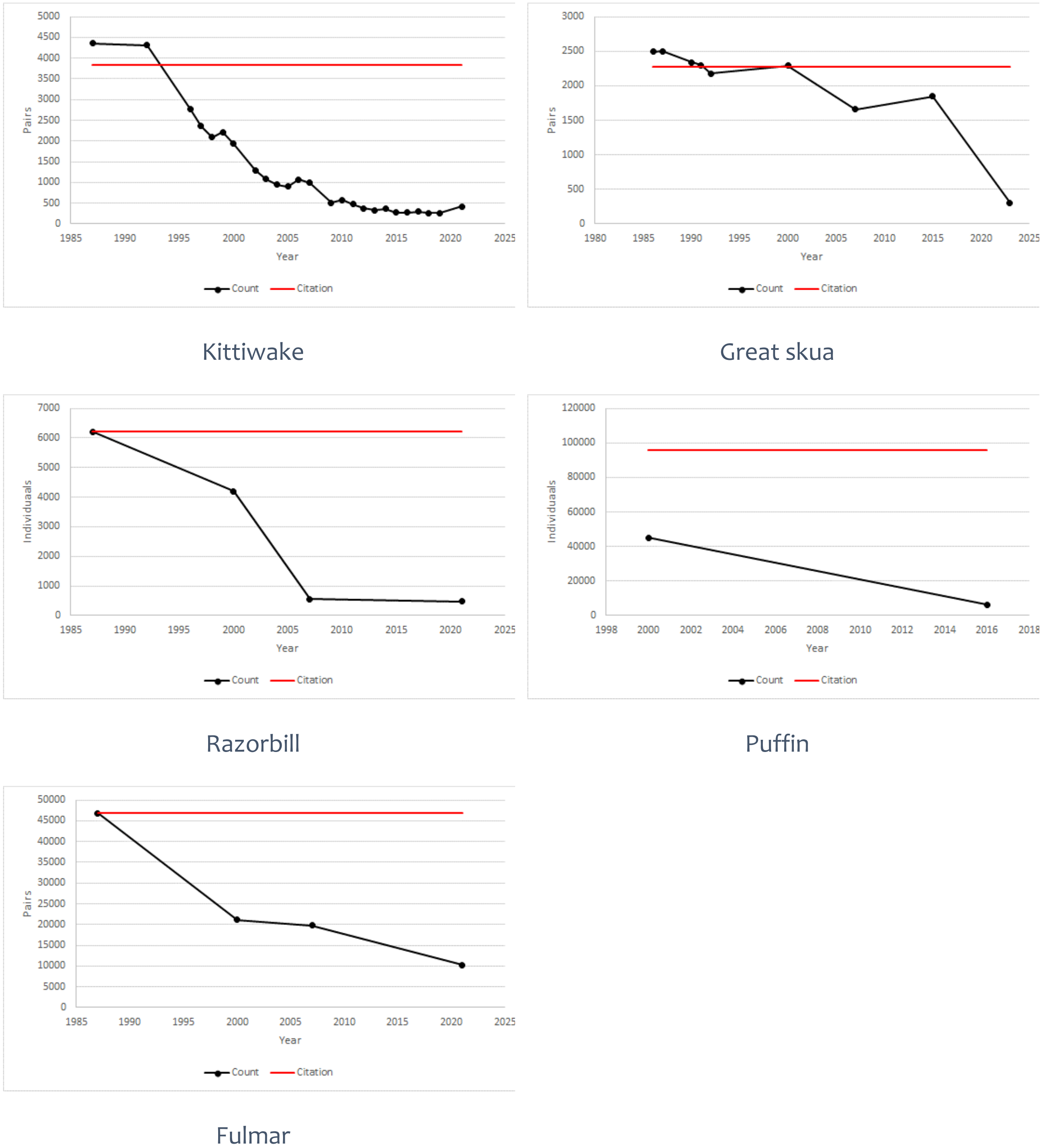


Figure 6-14 Foula SPA qualifying feature population trends from 1986 - 2023 (citation population size shown by red line).

6.3.12.4 Potential for the Project to impact the site's Conservation Objectives

805. The Foula SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **razorbill** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **puffin** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Collision impacts from the offshore Project during operation on the **great skua** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

806. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

807. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

808. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.12.5 Assessment of predicted impacts for Project alone and in-combination

6.3.12.5.1 Kittiwake

809. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Foula SPA population is presented in **Table 6-93**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-93. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the Foula SPA and change in baseline annual adult survival rate.

See ***Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts*** *for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.02	0.00	0.02	0.01
Mortality - Autumn migration (BDMPS)	0.01	0.00	0.01	0.00
Mortality - Spring migration (BDMPS)	0.01	0.00	0.01	0.01
Annual Project alone mortality (collision + displacement)*	0.03		0.04	
Percentage point change in annual adult survival rate	<0.01%		<0.01%	
Annual in-combination mortality excl. Berwick Bank	0.90		0.97	
Percentage point change in annual adult survival rate	0.11%		0.11%	
Annual in-combination mortality incl. Berwick Bank	1.07		1.22	
Percentage point change in annual adult survival rate	0.13%		0.14%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

810. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

811. Change in adult survival rate due to in-combination impacts did exceed 0.02%, but as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

812. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be restored.

813. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the Foula SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.12.5.2 Great skua

814. Predicted great skua collision mortality, by season, and change to annual adult survival rate apportioned to the Foula SPA population is presented in **Table 6-94**. In-combination impacts from other OWFs apportioned no great skua mortality to this SPA, so no further assessment of in-combination impacts is required.

Table 6-94. Estimated adult great skua Project alone collision seasonal and annual mortalities (birds per annum) apportioned to the Foula SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

GREAT SKUA	Collision (WCS)
Mortality - Breeding season (NatureScot)	0.00
Mortality - Non-breeding season (NatureScot)	0.04
Mortality - Autumn migration (BDMPS)	0.01
Mortality - Winter (BDMPS)	0.00
Mortality - Spring migration (BDMPS)	0.03
Annual Project alone mortality* (displacement)	0.04
Percentage point change in annual adult survival rate	<0.01%

** Sum of collision mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

815. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

816. The great skua feature condition was Unfavourable Declining, when last assessed in June 2023. Foula SPA supports the largest population of great skuas in the UK, with a citation population size of 2,270 pairs, which represented 17% of the world biogeographic population at that time[36]. However, population size at this colony decreased by 20% between the two seabird censuses, Seabird 2000 and Seabirds Count, to 1,846 pairs (Burnell *et al.*, 2023). Great skua populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). All the great skua colonies showed a substantial decline when counted in 2023, but the Foula SPA colony has undergone one of the largest declines, to just 308 AOTs (Tremlett *et al.*, 2024). Consequently, the population is now well below citation population size.

817. Whilst this population has undergone a substantial decline recently due to HPAI impacts, the very small Project alone impacts, of just 0.04 birds per annum, and the absence of any in-combination impacts, will not exacerbate the risk of any further declines and will not prevent or reduce the potential for this feature to recover and to be restored, in the long term.

818. Consequently, a conclusion of no AEoSI was reached for the great skua feature of the Foula SPA, from collision impacts from the Project alone and in-combination.

[36] *SiteLink - Foula SPA (nature.scot)*

6.3.12.5.3 Razorbill

819. Predicted razorbill displacement mortality, by season, and change to annual adult survival rate apportioned to the Foula SPA population is presented in **Table 6-95**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-95. Estimated adult razorbill Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the Foula SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

RAZORBILL	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.00	0.00
Mortality - Autumn migration (BDMPS)	0.00	0.00
Mortality - Winter (BDMPS)	0.00	0.00
Mortality - Spring migration (BDMPS)	0.00	0.00
Annual Project alone*	0.00	0.01
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination mortality excl. Berwick Bank	0.72	2.18
Percentage point change in annual adult survival rate	0.11%	0.34%
Annual in-combination mortality incl. Berwick Bank	0.85	2.56
Percentage point change in annual adult survival rate	0.13%	0.40%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

820. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

821. Change in adult survival rate due to in-combination impacts did exceed 0.02%, but as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

822. Project alone mortality was estimated to be 0.01 birds per annum. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to recover.

823. Consequently, a conclusion of no AEoSI was reached for the razorbill feature of the Foula SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.12.5.4 Puffin

824. Predicted puffin displacement mortality, by season, and change to annual adult survival rate apportioned to the Foula SPA population is presented in **Table 6-96**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

825. Note, almost all breeding season Project alone puffin mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-96. Estimated adult puffin Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the Foula SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

PUFFIN	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Morality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.37	1.12
Mortality - Non-breeding season (BDMPS)	0.37	1.12
Annual Project alone mortality* (displacement)	0.37	1.12
Percentage point change in annual adult survival rate	0.01%	0.013%
Annual in-combination excl. Berwick Bank	5.16	14.62
Percentage point change in annual adult survival rate	0.06%	0.17%
Annual in-combination incl. Berwick Bank	6.72	19.28
Percentage point change in annual adult survival rate	0.08%	0.23%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

826. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

827. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

828. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

829. **Table 6-97** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the puffin population at Foula SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

830. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-97. Foula SPA: Puffin PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	0.4	0.0000440402	25	0.9999	0.9999	0.0015	0.9971	1.0028	0.9982	0.9980	0.0389	0.9242	1.0754	50.0	50.0
Project alone High	1.1	0.0001321204	25	0.9999	0.9999	0.0015	0.9969	1.0027	0.9971	0.9975	0.0389	0.9206	1.0736	50.0	49.8
Incomb Low ex. BB	5.2	0.0006097663	25	0.9993	0.9993	0.0015	0.9963	1.0021	0.9832	0.9825	0.0382	0.9095	1.0605	49.2	51.3
Incomb High ex. BB	14.6	0.0017266938	25	0.9980	0.9980	0.0014	0.9951	1.0007	0.9494	0.9502	0.0360	0.8809	1.0219	45.6	55.9
Incomb Low inc. BB	6.7	0.0007931101	25	0.9991	0.9991	0.0014	0.9963	1.0018	0.9771	0.9778	0.0368	0.9066	1.0491	47.6	51.8
Incomb High inc. BB	19.3	0.0022767251	25	0.9974	0.9973	0.0014	0.9945	1.0000	0.9343	0.9340	0.0349	0.8678	1.0012	43.4	56.1
Project alone Low	0.4	0.0000440402	35	0.9999	0.9999	0.0015	0.9972	1.0029	0.9949	0.9979	0.0534	0.9049	1.1116	50.1	49.8
Project alone High	1.1	0.0001321204	35	0.9999	0.9998	0.0014	0.9970	1.0026	0.9950	0.9960	0.0498	0.8992	1.0967	50.0	50.0
Incomb Low ex. BB	5.2	0.0006097663	35	0.9993	0.9993	0.0014	0.9964	1.0021	0.9764	0.9765	0.0517	0.8748	1.0831	48.4	51.4
Incomb High ex. BB	14.6	0.0017266938	35	0.9980	0.9980	0.0014	0.9951	1.0007	0.9308	0.9325	0.0472	0.8427	1.0297	43.3	55.1
Incomb Low inc. BB	6.7	0.0007931101	35	0.9991	0.9991	0.0014	0.9965	1.0019	0.9689	0.9704	0.0480	0.8803	1.0708	46.9	52.5
Incomb High inc. BB	19.3	0.0022767251	35	0.9973	0.9973	0.0015	0.9945	1.0002	0.9077	0.9092	0.0487	0.8179	1.0059	41.1	56.9
Project alone Low	0.4	0.0000440402	50	1.0000	1.0000	0.0015	0.9970	1.0029	0.9988	1.0005	0.0791	0.8552	1.1633	49.8	50.4
Project alone High	1.1	0.0001321204	50	1.0000	1.0000	0.0015	0.9968	1.0031	0.9980	1.0007	0.0772	0.8500	1.1686	51.0	49.1
Incomb Low ex. BB	5.2	0.0006097663	50	0.9995	0.9995	0.0015	0.9965	1.0026	0.9740	0.9783	0.0778	0.8374	1.1389	48.7	51.2
Incomb High ex. BB	14.6	0.0017266938	50	0.9986	0.9986	0.0015	0.9957	1.0018	0.9321	0.9359	0.0720	0.8008	1.0927	45.8	54.5
Incomb Low inc. BB	6.7	0.0007931101	50	0.9994	0.9994	0.0015	0.9965	1.0023	0.9676	0.9736	0.0739	0.8361	1.1319	48.5	51.1
Incomb High inc. BB	19.3	0.0022767251	50	0.9982	0.9982	0.0015	0.9952	1.0012	0.9113	0.9139	0.0705	0.7791	1.0561	44.7	55.4

831. Predicted Project alone impacts on the puffin population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

832. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, including Berwick Bank impacts, was 0.9973 (95% c.i. 0.9945-1.0002) (**Table 6-97**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.27%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the puffin population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. The Project contributed a mortality of 1 bird per annum to the in-combination total of 19 birds per annum (including Berwick Bank impacts, worst case scenario).

833. The puffin feature was well below the citation population size of 16,000 pairs and condition was Unfavourable No Change, when last assessed in May 2016. Population size at this colony decreased by 81% between the two seabird censuses, Seabird 2000 and Seabirds Count, to 4,234 AOB (Apparently Occupied Burrows) (Burnell *et al.*, 2023). There is no evidence of puffin populations being impacted by the HPAI epidemic and no additional counts of puffins on Foula SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

834. Whilst the puffin population on Foula SPA has substantially declined, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any future declines that might occur and will not prevent or reduce the potential for this population to be restored in the long-term.

835. Consequently, a conclusion of no AEoSI was reached for the puffin feature of the Foula SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.12.5.5 Fulmar

836. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the Foula SPA population is presented in **Table 6-98**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features.

Table 6-98. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities (birds per annum) apportioned to the Foula SPA and change in baseline annual adult survival rate

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Morality - Breeding season (NatureScot)	0.011	0.034
Morality - Non-breeding season (NatureScot)	0.473	1.420
Morality - Autumn migration (BDMPS)	0.181	0.544
Morality - Winter (BDMPS)	0.079	0.237
Morality - Spring migration (BDMPS)	0.213	0.638
Annual Project alone mortality* (displacement)	0.485	1.454
Percentage point change in annual adult survival rate	0.002%	0.007%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

837. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination assessment was undertaken for fulmar.

838. Fulmar feature condition was Unfavourable No Change, when last assessed in June 2021. There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmar at Foula SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

839. The very small predicted mortality from Project impacts on this population will not prevent or reduce the potential for this feature to recover in the long-term.

840. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the Foula SPA, from displacement and barrier impacts from the Project alone. No in-combination assessment was undertaken for fulmar.

6.3.12.6 Conclusions

841. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Foula SPA** from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

842. A conclusion of **no AEoSI** was reached for the **great skua** feature of the **Foula SPA** from collision impacts from the **Project alone** and **in-combination** with other OWFs.

843. A conclusion of **no AEoSI** was reached for the **razorbill** feature of the **Foula SPA** from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

844. A conclusion of **no AEoSI** was reached for the **puffin** feature of the **Foula SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

845. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Foula SPA** from displacement and barrier impacts from the **Project alone**.

846. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, great skua, razorbill, puffin and fulmar, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Foula SPA**.

847. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Foula SPA** was reached.

6.3.13 Fowlsheugh SPA

6.3.13.1 Site Description

848. The Fowlsheugh SPA was classified on 31 August 1992, including marine extension classified on 25 September 2009, due to the populations of breeding seabirds. The site is approximately 237 km south-east of the Project.

849. 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.

6.3.13.2 Conservation Objectives for the SPA

850. The conservation objectives of the Fowlsheugh SPA are to:

- 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
- 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.

6.3.13.3 Qualifying features

851. The qualifying features of the SPA are presented below in **Table 6-99.**

852. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5.*

Table 6-99. Qualifying interests and condition for the Fowlsheugh SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

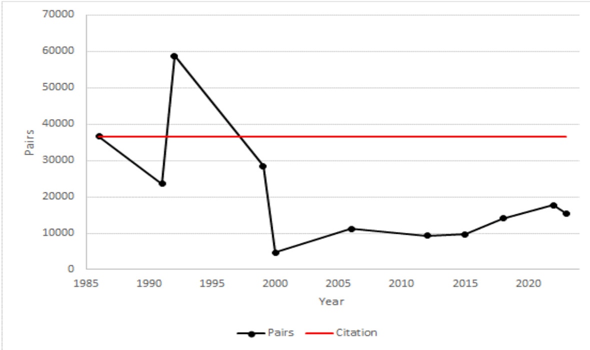
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake* (breeding)	36,650 pairs, 7.5% of the GB population, 1.2 % of World population	14,039 pairs	Unfavourable Declining	19 June 2018	Red
Herring gull* (breeding)	3,190 pairs, 2% of the GB population	1,035 pairs	Unfavourable No change	19 June 2018	Red
Guillemot* (breeding)	56,450 individuals, 5% of GB population, 1.7% of Western European population	69,828 individuals	Favourable Maintained	19 June 2018	Amber
Razorbill* (breeding)	5,800 individuals, 3.9% of the GB population	14,063 individuals	Favourable Maintained	19 June 2018	Amber
Fulmar* (breeding)	1,170 pairs, 0.2% of the GB population	525 pairs	Unfavourable Declining	3 June 2015	Amber
Seabird assemblage (breeding)	regularly supports 145,000 seabirds	n/a	Favourable Maintained	19 June 2018	n/a

853. The Fowlsheugh SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 145,000 seabirds including nationally important populations of the following species: black-legged kittiwake, razorbill, Northern fulmar, common guillemot and herring gull.

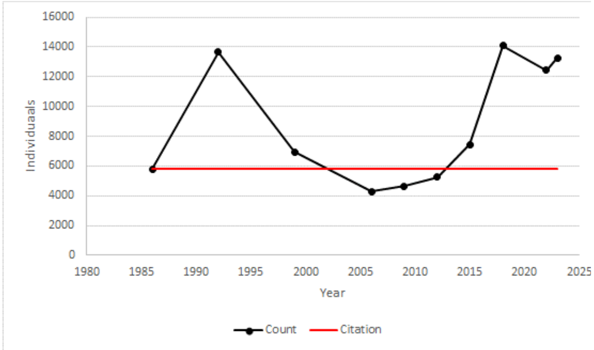
854. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage), colony count data between 1986 and 2023 were extracted from the SMP database. These counts were plotted and compared with the citation population size (**Figure 6-15**).

855. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage), colony count data between 1986 and 2023 were extracted

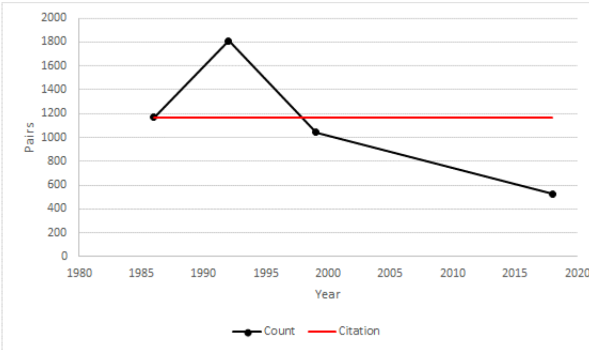
from the SMP database. These counts were plotted and compared with the citation population size.



Kittiwake



Razorbill



Fulmar

Figure 6-15. Fowlsheugh SPA kittiwake qualifying feature population trends from 1986 - 2023 (citation population size shown by red line).

6.3.13.4 Potential for the Project to impact the site's conservation objectives

856. The Fowlsheugh SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **razorbill** qualifying feature, during the non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

857. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway.

Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

858. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

859. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.13.5 Assessment of predicted impacts for Project alone and in-combination

860. An in-combination assessment was undertaken that collated quantitative information on impacts to features of this SPA from published consent applications. Note that no other OWFs have been required to undertake a quantitative assessment of fulmar displacement/barrier impacts and so an in-combination assessment was not possible for this species.

861. Other reasonably foreseeable projects which have not yet submitted an application may also impact some of the qualifying features of this site. MD-LOT advised (by email, 10 June 2024) that a qualitative assessment of OWF projects for which a Scoping Opinion has been adopted should be undertaken.

862. OWF projects for which a Scoping Opinion has been adopted and which identified possible impacts from their project on the Fowlsheugh SPA, in their Scoping Reports, are listed in **Table 6-100**.

Table 6-100. In-combination project with the potential to impact the Fowlsheugh SPA that have not yet submitted an application. Only features which could be impacted by Project impacts are listed

SPA qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Black-legged kittiwake				Y	Y	
Northern fulmar			Y	Y	Y	
Razorbill			Y	Y	Y	

6.3.13.5.1 Kittiwake

863. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Fowlsheugh SPA population is presented in **Table** 6-101. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-101. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the Fowlsheugh SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.10	0.02	0.10	0.06
Mortality - Non-breeding season (NatureScot)	0.61	0.10	0.61	0.29
Mortality - Autumn migration (BDMPS)	0.22	0.03	0.22	0.09
Mortality - Spring migration (BDMPS)	0.39	0.07	0.39	0.20
Annual Project alone mortality (collision + displacement)*	0.83		1.06	
Percentage point change in annual adult survival rate	<0.01%		<0.01%	
Annual in-combination mortality excl Berwick Bank	71.59		87.68	
Percentage point change in annual adult survival rate	0.25%		0.31%	
Annual in-combination mortality incl Berwick Bank	138.28		173.98	
Percentage point change in annual adult survival rate	0.49%		0.62%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

864. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

865. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

866. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

867. **Table 6-102** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the kittiwake population at Fowlsheugh SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA:**

PVA at SPA population scales for Project alone and in-combination impacts includes information on all inputs to this PVA and a plot showing population size over time.

868. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-102. Fowlsheugh SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	0.8	0.00002942788	25	1.0000	1.0000	0.0006	0.9987	1.0012	0.9997	0.9996	0.0172	0.9650	1.0344	50.2	49.8
Project alone CRM+High	1.1	0.00003768423	25	0.9999	0.9999	0.0006	0.9987	1.0012	0.9983	0.9988	0.0172	0.9650	1.0323	49.7	50.2
Incomb CRM+Low ex. BB	71.6	0.00254974377	25	0.9970	0.9970	0.0006	0.9958	0.9982	0.9246	0.9247	0.0156	0.8943	0.9575	40.7	58.0
Incomb CRM+High ex. BB	87.7	0.00312265563	25	0.9963	0.9963	0.0006	0.9950	0.9975	0.9080	0.9079	0.0152	0.8778	0.9375	39.0	60.4
Incomb CRM+Low inc. BB	138.3	0.00492502247	25	0.9942	0.9941	0.0006	0.9929	0.9954	0.8596	0.8588	0.0147	0.8292	0.8864	34.0	65.5
Incomb CRM+High inc. BB	174.0	0.00619624566	25	0.9927	0.9926	0.0006	0.9914	0.9939	0.8250	0.8254	0.0142	0.7981	0.8541	31.3	69.7
Project alone CRM+Low	0.8	0.00002942788	35	1.0000	1.0000	0.0005	0.9988	1.0010	1.0002	0.9993	0.0202	0.9589	1.0363	49.9	50.1
Project alone CRM+High	1.1	0.00003768423	35	0.9999	1.0000	0.0005	0.9989	1.0010	0.9985	0.9984	0.0198	0.9602	1.0403	50.0	49.9
Incomb CRM+Low ex. BB	71.6	0.00254974377	35	0.9970	0.9970	0.0006	0.9959	0.9981	0.8979	0.8973	0.0183	0.8611	0.9331	41.0	59.1
Incomb CRM+High ex. BB	87.7	0.00312265563	35	0.9963	0.9963	0.0005	0.9952	0.9974	0.8754	0.8753	0.0170	0.8411	0.9079	38.3	60.9
Incomb CRM+Low inc. BB	138.3	0.00492502247	35	0.9942	0.9942	0.0006	0.9931	0.9953	0.8111	0.8110	0.0166	0.7774	0.8445	32.9	66.3
Incomb CRM+High inc. BB	174.0	0.00619624566	35	0.9927	0.9927	0.0006	0.9916	0.9938	0.7673	0.7671	0.0157	0.7360	0.7989	28.7	70.5
Project alone CRM+Low	0.8	0.00002942788	50	1.0000	1.0000	0.0005	0.9991	1.0009	0.9999	0.9992	0.0239	0.9543	1.0460	50.1	50.0
Project alone CRM+High	1.1	0.00003768423	50	1.0000	1.0000	0.0005	0.9990	1.0008	0.9976	0.9985	0.0239	0.9518	1.0454	50.1	49.9
Incomb CRM+Low ex. BB	71.6	0.00254974377	50	0.9979	0.9979	0.0005	0.9969	0.9988	0.8975	0.8973	0.0216	0.8539	0.9402	40.6	57.4
Incomb CRM+High ex. BB	87.7	0.00312265563	50	0.9974	0.9974	0.0005	0.9964	0.9983	0.8759	0.8754	0.0210	0.8335	0.9141	39.5	59.4
Incomb CRM+Low inc. BB	138.3	0.00492502247	50	0.9959	0.9959	0.0005	0.9950	0.9968	0.8106	0.8111	0.0199	0.7729	0.8497	33.8	64.2
Incomb CRM+High inc. BB	174.0	0.00619624566	50	0.9948	0.9948	0.0005	0.9938	0.9958	0.7677	0.7670	0.0194	0.7263	0.8048	30.8	69.0

869. Predicted Project alone impacts on the kittiwake population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9927 (95% c.i. 0.9916-0.9938) (**Table 6-102**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.73%. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest This predicted small change to population growth rate indicates that the kittiwake population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of only 1 bird per annum to the in-combination total of 174 birds per annum (including Berwick Bank Wind Farm impacts, worst case scenario). The in-combination total excluding Berwick Bank Wind Farm impacts was 88 birds per annum, which resulted in a change in population growth rate of 0.37%, i.e. Berwick Bank Wind Farm impacts comprise a substantial proportion of the in-combination impacts.

870. The kittiwake feature condition was Unfavourable Declining, when last assessed in June 2018. Population size at this colony decreased by 51% between the two seabird censuses, Seabird 2000 and Seabirds Count, to 14,039 AON (Burnell *et al.*, 2023). This is well below the citation population size of 36,650 pairs[37]. Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). Contrary to the observed declines between the two seabird censuses, the kittiwake population at Fowlsheugh SPA had increased by 64% to 15,483 AON, when counted in 2023, suggesting this population has not been impacted by HPAI (Tremlett *et al.*, 2024).

871. The kittiwake feature of Fowlsheugh SPA is substantially smaller than citation population size although population size has increased strongly recently. the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not further exacerbate any declines and will not prevent or reduce the potential for this population to recover in the long-term.

872. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the Fowlsheugh SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.13.5.2 Razorbill

873. Predicted razorbill displacement mortality, by season, and change to annual adult survival rate apportioned to the Fowlsheugh SPA population is presented in **Table 6-103**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

[37] SiteLink - Fowlsheugh SPA (nature.scot)

Table 6-103. Estimated adult razorbill Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the Fowlsheugh SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

RAZORBILL	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.02	0.05
Mortality - Autumn migration (BDMPS)	0.01	0.02
Mortality - Winter (BDMPS)	0.00	0.00
Mortality - Spring migration (BDMPS)	0.01	0.02
Annual Project alone mortality* (Displacement)	0.02	0.05
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination excl Berwick Bank	82.42	147.49
Percentage point change in annual adult survival rate	0.44%	0.78%
Annual in-combination incl Berwick Bank	99.71	177.79
Percentage point change in annual adult survival rate	0.53%	0.94%

**Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

874. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

875. Change in adult survival rate due to in-combination impacts did exceed 0.02%, but as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

876. Project alone mortality was estimated to be 0.05 birds per annum. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to recover.

877. Consequently, a conclusion of no AEoSI was reached for the razorbill feature of the Fowlsheugh SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.13.5.3 Fulmar

878. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the Fowlsheugh SPA population is presented in **Table 6-104**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features

Table 6-104. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities (birds per annum) apportioned to the Fowlsheugh SPA and change in baseline annual adult survival rate

***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.000	0.001
Mortality - Non-breeding season (NatureScot)	0.005	0.015
Mortality - Autumn migration (BDMPS)	0.002	0.006
Mortality - Winter (BDMPS)	0.001	0.002
Mortality - Spring migration (BDMPS)	0.002	0.007
Annual Project alone mortality* (displacement)	0.005	0.016
Percentage point change in annual adult survival rate	0.001%	0.002%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

879. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination assessment was undertaken for fulmar.

880. Fulmar feature condition was Unfavourable Declining at the Fowlsheugh SPA, when last assessed in June 2018. There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmar at Fowlsheugh SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

881. The very small predicted mortality from Project impacts on this population will not prevent or reduce the potential for this feature to recover and be restored in the long-term.

882. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the Fowlsheugh SPA, from displacement and barrier impacts from the Project alone. No in-combination assessment was undertaken for fulmar.

6.3.13.6 Conclusions

883. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Fowlsheugh SPA** from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

884. A conclusion of **no AEoSI** was reached for the **razorbill** feature of the **Fowlsheugh SPA** from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

885. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Fowlsheugh SPA** from displacement and barrier impacts from the **Project alone**.

886. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, razorbill and fulmar, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Fowlsheugh SPA**.

887. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Fowlsheugh SPA** was reached.

6.3.14 Handa SPA

6.3.14.1 Site Description

888. The Handa SPA was classified on 25 April 1990, with marine extension classified on 25 September 2009, due to its populations of breeding seabirds. The site is approximately 56 km south-west of the Project.

889. Handa SPA consists of an island surrounded by high sea-cliffs and adjacent coastal waters lying a short distance from the west coast of Sutherland in Scotland. It provides a strategic nesting locality for seabirds that feed in the productive waters of the northern Minch, outside the SPA. Most of the island is vegetated with submaritime grasslands and heaths. The SPA's principal ornithological importance is for its breeding seabirds. The boundary of the SPA overlaps with the boundary of Handa Island SSSI, and the seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface.

6.3.14.2 Conservation Objectives for the SPA

890. The conservation objectives of the Handa SPA are to:

- 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
- 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.

6.3.14.3 Qualifying features

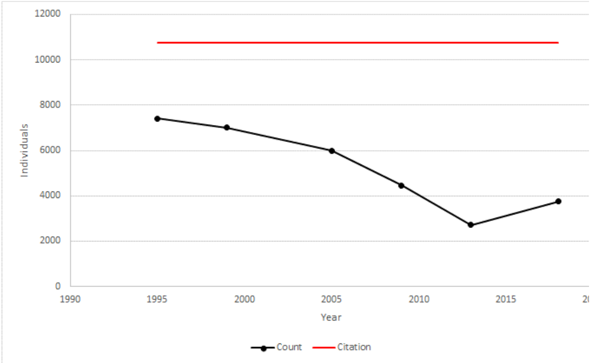
891. The qualifying features of the SPA are presented below in **Table 6-105**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

Table 6-105 Qualifying interests and condition for the Handa SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

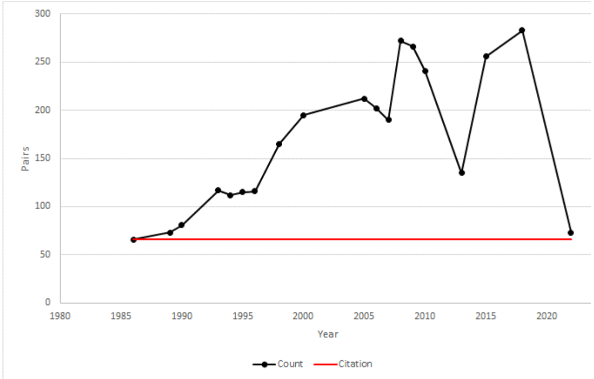
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake* (breeding)	10,732 pairs, 2.2% of the GB population	3,749 pairs	Unfavourable Recovering	1 June 2023	Red
Great skua* (breeding)	66 pairs, 0.8% of the GB population	283 pairs	Favourable Maintained	1 June 2023	Amber
Guillemot (breeding)	98,686 individuals, 2.9% of the North Atlantic biogeographic population	54,664 individuals	Unfavourable No change	1 June 2023	Amber
Razorbill (breeding)	16,394 individuals, 1.9% of the A.t. islandica biogeographic population	8,207 individuals	Unfavourable Recovering	1 June 2019	Amber
Fulmar* (breeding)	3,500 pairs, 0.7% of the GB population	723 pairs	Unfavourable Declining	1 June 2022	Amber
Seabird assemblage (breeding)	regularly supports 200,000 seabirds including nationally important populations	n/a	Unfavourable Declining	6 April 2017	n/a

892. The Handa SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 200,000 seabirds including nationally important populations of the following species: great skua, black-legged kittiwake, Northern fulmar, common guillemot and razorbill.

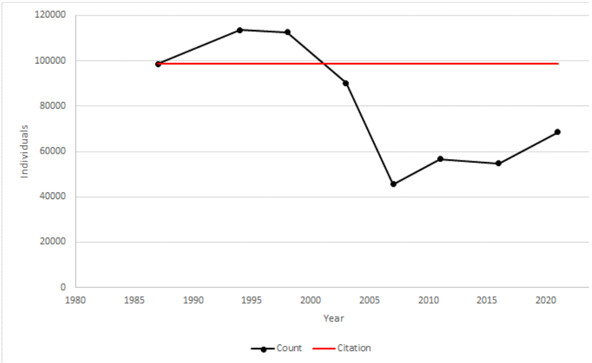
893. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage), colony count data was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-16**).



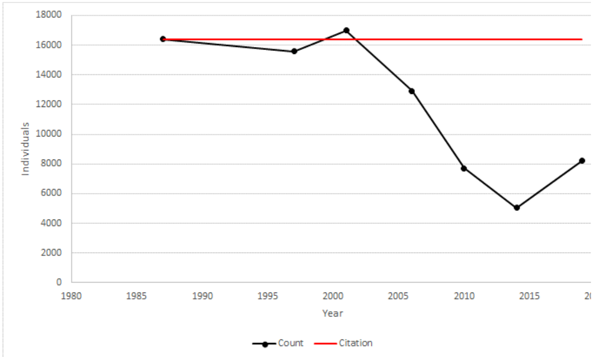
Kittiwake



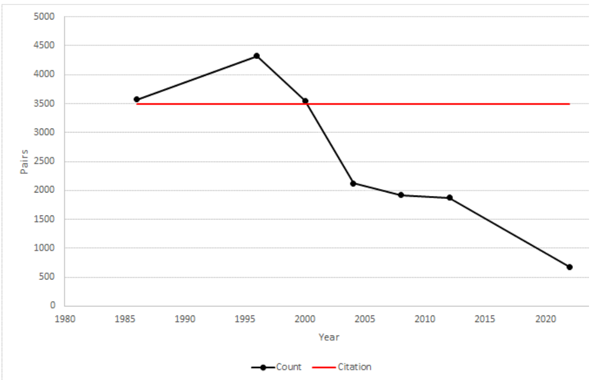
Great skua



Guillemot



Razorbill



Fulmar

Figure 6-16. Handa SPA qualifying feature population trends from 1987 – 2021 (citation population size shown by red line).

6.3.14.4 *Potential for the Project to impact the site's conservation objectives*

894. The Handa SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **guillemot** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **razorbill** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Collision impacts from the offshore Project during operation on the **great skua** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

895. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

896. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

897. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.14.5 *Assessment of predicted impacts for Project alone and in-combination*

6.3.14.5.1 Kittiwake

898. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Handa SPA population is presented in **Table 6-106**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-106. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the Handa SPA and change in baseline annual adult survival rate.

See ***Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts*** *for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.43	0.07	0.43	0.24
Mortality - Non-breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Autumn migration (BDMPS)	0.00	0.00	0.00	0.00
Mortality - Spring migration (BDMPS)	0.00	0.00	0.00	0.00
Annual Project alone mortality (collision + displacement)*	0.50		0.67	
Percentage point change in annual adult survival rate	0.01%		0.01%	
Annual in-combination mortality excl. Berwick Bank	1.05		1.41	
Percentage point change in annual adult survival rate	0.01%		0.02%	
Annual in-combination mortality incl. Berwick Bank	1.61		2.13	
Percentage point change in annual adult survival rate	0.02%		0.03%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

899. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

900. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

901. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts

902. **Table 6-107** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the kittiwake population at Handa SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA**

population scales for Project alone and in-combination impacts includes information on all inputs to this PVA and a plot showing population size over time.

903. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-107. Handa SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	0.5	0.00006733928	25	1.0000	1.0000	0.0013	0.9973	1.0024	0.9996	0.9995	0.0336	0.9329	1.0601	50.2	49.7
Project alone CRM+High	0.7	0.00008991610	25	0.9999	0.9999	0.0012	0.9976	1.0022	0.9972	0.9976	0.0311	0.9380	1.0563	50.4	49.7
Incomb CRM+Low ex. BB	1.1	0.00014043589	25	0.9998	0.9998	0.0012	0.9974	1.0022	0.9957	0.9955	0.0312	0.9315	1.0586	50.3	49.6
Incomb CRM+High ex. BB	1.4	0.00018801560	25	0.9998	0.9998	0.0012	0.9975	1.0022	0.9949	0.9957	0.0314	0.9364	1.0571	49.7	50.3
Incomb CRM+Low inc. BB	1.6	0.00021473033	25	0.9997	0.9997	0.0012	0.9974	1.0022	0.9922	0.9931	0.0324	0.9298	1.0635	49.8	50.3
Incomb CRM+High inc. BB	2.1	0.00028346187	25	0.9996	0.9997	0.0012	0.9975	1.0019	0.9906	0.9915	0.0311	0.9325	1.0516	49.8	50.7
Project alone CRM+Low	0.5	0.00006733928	35	0.9999	1.0000	0.0011	0.9978	1.0023	0.9983	0.9996	0.0399	0.9227	1.0793	49.7	50.6
Project alone CRM+High	0.7	0.00008991610	35	0.9999	0.9999	0.0010	0.9979	1.0020	0.9967	0.9976	0.0369	0.9249	1.0705	49.2	50.7
Incomb CRM+Low ex. BB	1.1	0.00014043589	35	0.9998	0.9999	0.0010	0.9979	1.0019	0.9947	0.9955	0.0369	0.9260	1.0693	48.8	51.2
Incomb CRM+High ex. BB	1.4	0.00018801560	35	0.9998	0.9998	0.0010	0.9979	1.0018	0.9936	0.9953	0.0372	0.9271	1.0723	49.0	50.7
Incomb CRM+Low inc. BB	1.6	0.00021473033	35	0.9998	0.9998	0.0010	0.9978	1.0018	0.9894	0.9919	0.0383	0.9176	1.0701	49.4	50.6
Incomb CRM+High inc. BB	2.1	0.00028346187	35	0.9997	0.9997	0.0010	0.9976	1.0017	0.9883	0.9889	0.0366	0.9198	1.0614	48.2	51.6
Project alone CRM+Low	0.5	0.00006733928	50	0.9999	1.0000	0.0009	0.9981	1.0019	0.9982	0.9997	0.0473	0.9102	1.0982	49.8	50.1
Project alone CRM+High	0.7	0.00008991610	50	0.9999	0.9999	0.0009	0.9983	1.0016	0.9966	0.9971	0.0439	0.9163	1.0863	50.0	50.0
Incomb CRM+Low ex. BB	1.1	0.00014043589	50	0.9999	0.9999	0.0009	0.9982	1.0016	0.9927	0.9953	0.0444	0.9128	1.0834	49.4	50.4
Incomb CRM+High ex. BB	1.4	0.00018801560	50	0.9999	0.9999	0.0009	0.9981	1.0015	0.9933	0.9953	0.0439	0.9097	1.0827	50.1	49.8
Incomb CRM+Low inc. BB	1.6	0.00021473033	50	0.9998	0.9998	0.0009	0.9981	1.0017	0.9912	0.9926	0.0466	0.9053	1.0942	48.4	51.0
Incomb CRM+High inc. BB	2.1	0.00028346187	50	0.9998	0.9998	0.0009	0.9980	1.0014	0.9894	0.9895	0.0438	0.9048	1.0809	49.2	50.8

904. Predicted Project alone impacts on the kittiwake population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

905. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9997 (95% c.i. 0.9976-1.0017) (**Table 6-107**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.03%. This very small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the kittiwake population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts.

906. The kittiwake feature condition was Unfavourable Recovering when last assessed in June 2023. Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The Handa SPA kittiwake population had increased when counted in 2023, by 22% compared with the Seabirds Count estimate (Tremlett *et al.*, 2024), suggesting this population was not impacted by HPAI.

907. Whilst the kittiwake population at Handa SPA is substantially smaller than citation population size recent increases in population size and the fact that the Project alone and in-combination impacts on this population are very small, impacts are predicted to not further exacerbate any future declines and will not prevent or reduce the potential for this population to recover in the long term.

908. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the Handa SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.14.5.2 Great skua

909. Predicted great skua collision mortality, by season, and change to annual adult survival rate apportioned to the Fair Isle SPA population is presented in **Table 6-108**. In-combination impacts from other OWFs apportioned no great skua mortality to this SPA, so no further assessment of in-combination impacts is required.

Table 6-108. Estimated adult great skua Project alone collision seasonal and annual mortalities (birds per annum) apportioned to the Handa SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

GREAT SKUA	Collision (WCS)
Mortality - Breeding season (NatureScot)	0.00
Mortality - Non-breeding season (NatureScot)	0.00
Mortality - Autumn migration (BDMPS)	0.00
Mortality - Winter (BDMPS)	0.00

GREAT SKUA	Collision (WCS)
Mortality - Spring migration (BDMPS)	0.00
Annual Project alone mortality* (collision)	0.00
Percentage point change in annual adult survival rate	<0.01%

** Sum of collision mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

910. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination impacts from other OWFs on this feature were found.

911. Great skua feature condition is Favourable Maintained, when last assessed in June 2023. Great skua populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). Counts of great skuas on Handa SPA in 2023 found a 70% decrease in population size to 84 Apparently Occupied Territories (Tremlett *et al.,* 2024). The population remains above citation population size, of 66 pairs[38].

912. Whilst this population has undergone a recent decline due to HPAI impacts, the very small Project alone impacts and the absence of any in-combination impacts will not prevent or reduce the potential for this feature to be maintained in the long term.

913. Consequently, a conclusion of no AEoSI was reached for the great skua feature of the Handa SPA, from collision impacts from the Project alone and in-combination.

6.3.14.5.3 Guillemot

914. Predicted guillemot displacement mortality, by season, and change to annual adult survival rate apportioned to the Handa SPA population is presented in **Table 6-109.**

915. NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts (letter from NatureScot to the Project, dated 3 June 2024). However, Berwick Bank Wind Farm did not have connectivity with any of the SPAs with guillemot features, potentially impacted by the Project and so the in-combination assessment does not include any Berwick Bank impacts.

916. Note, almost all breeding season Project alone guillemot mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

[38] SiteLink - Handa SPA (nature.scot)

Table 6-109. Estimated adult guillemot Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the Handa SPA and change in baseline annual adult survival rate.

See ***Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts*** *for more details on calculation of mortalities and changes to survival rate.*

GUILLEMOT	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	2.09	6.26
Mortality - Non-breeding season (BDMPS)	2.09	6.26
Annual Project alone mortality* (displacement)	2.09	6.26
Percentage point change in annual adult survival rate	<0.01%	0.01%
Annual in-combination	26.16	78.34
Percentage point change in annual adult survival rate	0.04%	0.11%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

917. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

918. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

919. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

920. **Table 6-110** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the guillemot population at Handa SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

921. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse

effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-110. Handa SPA: Guillemot PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	2.1	0.000029	25	1.0000	1.0000	0.0002	0.9995	1.0004	0.9992	0.9992	0.0063	0.9869	1.0106	49.9	50.3
Project alone High	6.2	0.000085	25	0.9999	0.9999	0.0002	0.9995	1.0003	0.9974	0.9975	0.0060	0.9863	1.0097	49.6	50.5
Incomb Low	26.2	0.000357	25	0.9996	0.9996	0.0002	0.9992	1.0001	0.9897	0.9897	0.0062	0.9777	1.0020	48.1	52.1
Incomb High	78.3	0.001069	25	0.9988	0.9988	0.0002	0.9983	0.9993	0.9695	0.9697	0.0059	0.9581	0.9812	43.6	56.7
Project alone Low	2.1	0.000029	35	1.0000	1.0000	0.0002	0.9996	1.0003	0.9990	0.9988	0.0069	0.9857	1.0119	49.8	50.3
Project alone High	6.2	0.000085	35	0.9999	0.9999	0.0002	0.9995	1.0003	0.9970	0.9967	0.0068	0.9836	1.0095	49.6	50.6
Incomb Low	26.2	0.000357	35	0.9996	0.9996	0.0002	0.9993	1.0000	0.9858	0.9858	0.0065	0.9733	0.9987	47.8	53.1
Incomb High	78.3	0.001069	35	0.9988	0.9988	0.0002	0.9985	0.9992	0.9580	0.9581	0.0063	0.9456	0.9700	42.3	58.3
Project alone Low	2.1	0.000029	50	1.0000	1.0000	0.0001	0.9997	1.0003	0.9990	0.9989	0.0077	0.9845	1.0134	50.0	50.0
Project alone High	6.2	0.000085	50	0.9999	0.9999	0.0001	0.9997	1.0002	0.9969	0.9969	0.0075	0.9830	1.0120	49.9	50.2
Incomb Low	26.2	0.000357	50	0.9997	0.9997	0.0001	0.9994	1.0000	0.9858	0.9857	0.0073	0.9713	1.0002	47.3	51.9
Incomb High	78.3	0.001069	50	0.9992	0.9992	0.0001	0.9989	0.9994	0.9579	0.9579	0.0071	0.9434	0.9710	41.9	56.7

922. Predicted Project alone impacts on the guillemot population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

923. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, was 0.9988 (95% c.i. 0.9985-0.9992) (**Table 6-110**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.12%. This very small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the guillemot population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. The Project contributed just 6 birds per annum to the in-combination total of 78 birds per annum.

924. The guillemot feature condition was Unfavourable No Change, when last assessed in June 2023. Population size at this colony decreased by 51% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). Guillemot populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The Handa SPA guillemot population had further declined, by 16%, when counted in 2023 (Tremlett *et al.*, 2024).

925. Whilst the guillemot population at the Handa SPA is substantially smaller than citation population size and has recently declined further, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not further exacerbate any declines and will not prevent or reduce the potential for this population to recover in the long-term.

926. Consequently, a conclusion of no AEoSI was reached for the guillemot feature of the Handa SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.14.5.4 Razorbill

927. Predicted razorbill displacement mortality, by season, and change to annual adult survival rate apportioned to the Handa SPA population is presented in **Table 6-111**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-111. Estimated adult razorbill Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the Handa SPA and change in baseline annual adult survival rate.

See ***Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts*** *for more details on calculation of mortalities and changes to survival rate*

RAZORBILL	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.21	0.28
Mortality - Non-breeding season (NatureScot)	0.00	0.00
Mortality - Autumn migration (BDMPS)	0.00	0.00
Mortality - Winter (BDMPS)	0.00	0.00
Mortality - Spring migration (BDMPS)	0.00	0.00
Annual Project alone mortality* (displacement)	0.21	0.28
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination mortality excl. Berwick Bank	1.29	3.34
Percentage point change in annual adult survival rate	0.01%	0.03%
Annual in-combination mortality incl. Berwick Bank	1.36	3.56
Percentage point change in annual adult survival rate	0.01%	0.03%

**Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

928. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. .

929. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

930. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

931. **Table 6-112** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the razorbill population at Handa SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA**

population scales for Project alone and in-combination impacts includes information on all inputs to this PVA and a plot showing population size over time.

932. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-112. Handa SPA: Razorbill PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	0.2	0.00001886145	25	1.0000	1.0000	0.0012	0.9976	1.0024	1.0012	1.0011	0.0318	0.9412	1.0664	49.4	50.4
Project alone High	0.3	0.00002519092	25	1.0000	1.0000	0.0012	0.9977	1.0024	1.0000	1.0007	0.0310	0.9436	1.0640	49.4	50.8
Incomb Low ex. BB	1.3	0.00011703869	25	0.9999	0.9999	0.0012	0.9975	1.0023	0.9971	0.9982	0.0326	0.9324	1.0625	49.4	50.7
Incomb High ex. BB	3.3	0.00030388698	25	0.9997	0.9997	0.0012	0.9974	1.0019	0.9913	0.9921	0.0306	0.9345	1.0511	48.5	51.5
Incomb Low inc. BB	1.4	0.00012358646	25	0.9999	0.9999	0.0012	0.9976	1.0023	0.9954	0.9971	0.0318	0.9400	1.0626	49.0	50.6
Incomb High inc. BB	3.6	0.00032395996	25	0.9996	0.9996	0.0011	0.9973	1.0020	0.9895	0.9909	0.0301	0.9325	1.0532	48.3	51.0
Project alone Low	0.2	0.00001886145	35	1.0000	1.0000	0.0012	0.9977	1.0023	0.9980	1.0007	0.0423	0.9214	1.0879	50.4	49.4
Project alone High	0.3	0.00002519092	35	0.9999	1.0000	0.0011	0.9979	1.0023	0.9979	1.0001	0.0413	0.9267	1.0889	50.3	49.2
Incomb Low ex. BB	1.3	0.00011703869	35	0.9998	0.9999	0.0012	0.9976	1.0023	0.9945	0.9970	0.0428	0.9190	1.0884	49.9	50.2
Incomb High ex. BB	3.3	0.00030388698	35	0.9996	0.9997	0.0011	0.9974	1.0017	0.9868	0.9882	0.0394	0.9114	1.0642	48.1	50.8
Incomb Low inc. BB	1.4	0.00012358646	35	0.9998	0.9999	0.0011	0.9977	1.0022	0.9930	0.9959	0.0416	0.9186	1.0842	49.8	50.8
Incomb High inc. BB	3.6	0.00032395996	35	0.9997	0.9996	0.0011	0.9974	1.0018	0.9877	0.9880	0.0393	0.9115	1.0680	48.1	51.9
Project alone Low	0.2	0.00001886145	50	1.0000	1.0000	0.0011	0.9977	1.0024	0.9985	1.0026	0.0581	0.8933	1.1243	49.3	50.2
Project alone High	0.3	0.00002519092	50	0.9999	0.9999	0.0012	0.9977	1.0024	0.9950	0.9993	0.0601	0.8927	1.1325	50.8	49.4
Incomb Low ex. BB	1.3	0.00011703869	50	0.9999	0.9999	0.0012	0.9976	1.0022	0.9977	0.9985	0.0595	0.8860	1.1191	50.2	50.0
Incomb High ex. BB	3.3	0.00030388698	50	0.9997	0.9997	0.0011	0.9976	1.0019	0.9848	0.9884	0.0558	0.8856	1.1032	48.8	50.9
Incomb Low inc. BB	1.4	0.00012358646	50	0.9999	0.9999	0.0011	0.9977	1.0023	0.9929	0.9961	0.0590	0.8867	1.1212	50.5	49.7
Incomb High inc. BB	3.6	0.00032395996	50	0.9997	0.9997	0.0011	0.9974	1.0021	0.9862	0.9877	0.0578	0.8776	1.1095	48.8	51.1

933. Predicted Project alone impacts on the razorbill population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

934. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, including Berwick Bank impacts, was 0.9996 (95% c.i. 0.9974-1.0018) (**Table 6-112**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.04%. This very small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the razorbill population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. The Project contributed just 0.28 birds per annum to the in-combination total of 3.6 birds per annum.

935. The razorbill feature condition was Unfavourable Recovering, when last assessed in June 2019. There is no evidence of razorbill populations being impacted by the HPAI (Tremlett *et al.*, 2024).

936. Whilst the razorbill population at the Handa SPA is substantially smaller than citation population size, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any further declines and will not prevent or reduce the potential for this population to recover in the long-term.

937. Consequently, a conclusion of no AEoSI was reached for the razorbill feature of the Handa SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.14.5.5 Fulmar

938. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the Handa SPA population is presented in **Table 6-113**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features.

Table 6-113. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities (birds per annum) apportioned to the Handa SPA and change in baseline annual adult survival rate.

See ***Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts*** *for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.006	0.019
Mortality - Non-breeding season (NatureScot)	0.000	0.001
Mortality - Autumn migration (BDMPS)	0.000	0.000
Mortality - Winter (BDMPS)	0.000	0.001
Mortality - Spring migration (BDMPS)	0.000	0.000
Annual Project alone mortality* (displacement)	0.006	0.020
Percentage point change in annual adult survival rate	0.000%	0.001%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.*

939. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination assessment was undertaken for fulmar.

940. Fulmar feature condition was Unfavourable Declining, when last assessed in June 2022. There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmar at Handa SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

941. The very small predicted mortality from Project impacts on this population are predicted to be sufficiently small to not exacerbate any further declines and will not prevent or reduce the potential for this population to recover in the long-term.

942. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the Handa SPA, from displacement and barrier impacts from the Project alone. No in-combination assessment was undertaken for fulmar.

6.3.14.6 Conclusions

943. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Handa SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

944. A conclusion of **no AEoSI** was reached for the **great skua** feature of the **Handa SPA**, from collision impacts from the **Project alone** and **in-combination** with other OWFs.

945. A conclusion of **no AEoSI** was reached for the **guillemot** feature of the **Handa SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

946. A conclusion of **no AEoSI** was reached for the **razorbill** feature of the **Handa SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

947. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Handa SPA**, from displacement and barrier impacts from the **Project alone**.

948. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, great skua, guillemot, razorbill and fulmar, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Handa SPA**.

949. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Handa SPA** was reached.

6.3.15 Hermaness, Saxa Vord and Valla Field SPA

950. The Hermaness, Saxa Vord and Valla Field SPA was classified on 31 December 2001, including marine extension classified on 25 September 2009, due to its populations of breeding

seabirds. The site is on the islands of Unst in Shetland and is approximately 258km north-east of the Project.

6.3.15.1 *Site Description*

951. The Hermaness, Saxa Vord and Valla Field SPA was classified on 31 December 2001 (with a marine extension classified on 25 September 2009) due to the site's populations of breeding seabirds. The site is approximately 258 km north of the Project

952. Hermaness, Saxa Vord and Valla Field SPA in the north-west corner of the island of Unst, Shetland, at the northernmost tip of Britain. It consists of 100-200 m high sea cliffs and adjoining areas of grassland, heath and blanket bog.

953. The boundary of the SPA is coincident with that of the Hermaness SSSI, Saxa Vord SSSI, and Valla Field SSSI. The seaward extension extends approximately 2km into the marine environment to include the seabed, water column and surface.

954. Part of the site (Hermaness SSSI and Saxa Vord SSSI) was previously classified as Hermaness and Saxa Vord SPA on 29 March 1994 for fulmar, gannet, great skua, guillemot and puffin.

6.3.15.2 *Conservation Objectives for the SPA*

955. The conservation objectives of the Hermaness, Saxa Vord and Valla Field SPA are to:

- 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
- 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.

6.3.15.3 *Qualifying features*

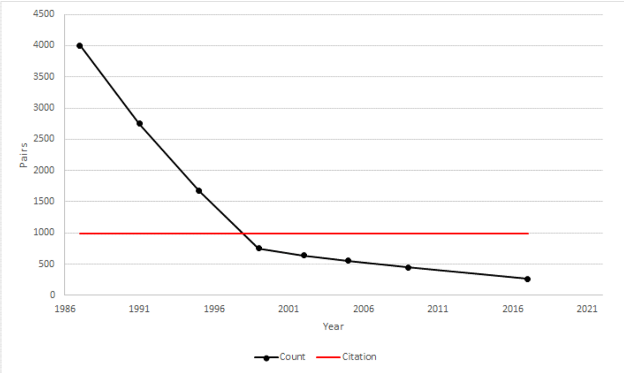
956. The qualifying features of the SPA are presented below in **Table 6-114**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

Table 6-114 Qualifying interests and condition for the Hermaness, Saxa Vord and Valla Field SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

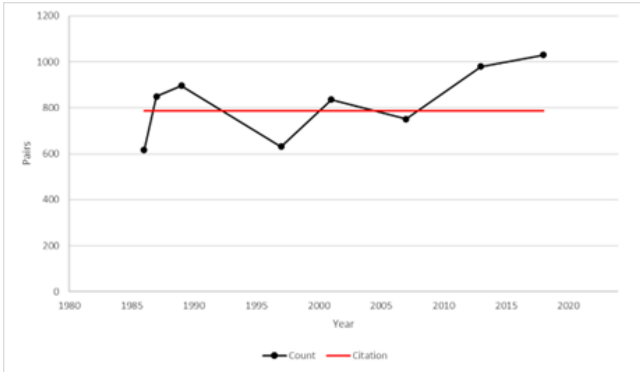
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake* (breeding)	922 pairs in 1999; 0.2% of the GB population	177 pairs	Unfavourable Declining	1 June 2023	Red
Great skua (breeding)	788 pairs in 1997, 9% of the British and 6% of the world population	1,030 pairs	Unfavourable Declining	1 June 2023	Amber
Guillemot* (breeding)	25,000 individuals over two surveys carried out in 1996 and 1999; 2% of the GB population	6,109 individuals	Unfavourable Declining	1 June 2023	Amber
Puffin (breeding)	55,000 individuals in 1999, 6% of the British and 3% of the total population of the sub-species *F. a. grabae*	14,375 pairs	Unfavourable Recovering	1 June 2019	Red
Fulmar* (breeding)	19,539 pairs in 1999; 4% of the GB population	13,208 pairs	Unfavourable Declining	1 June 2022	Amber
Gannet (breeding)	16,400 pairs in 1999, 8% of the British and 6% of the world population	29,562 pairs	Favourable Maintained	1 June 2023	Amber
Red-throated diver (breeding)	average of 26 proven breeding pairs for 1994 - 1999, 3% of the British breeding population	n/a	Unfavourable Declining	2 July 2013	Green
Shag* (breeding)	450 pairs in censuses in 1995 and 1999; 1% of the GB population	72 pairs	Unfavourable Declining	1 June 2019	Red
Seabird assemblage (breeding)	regularly support 157,500 seabirds including nationally important populations	n/a	Unfavourable Declining	28 June 2017	n/a

957. The Hermaness, Saxa Vord and Valla Field SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 150,000 seabirds including nationally important populations of the following species: black-legged kittiwake, Northern fulmar, Atlantic puffin, common guillemot, great skua, European shag and Northern gannet.

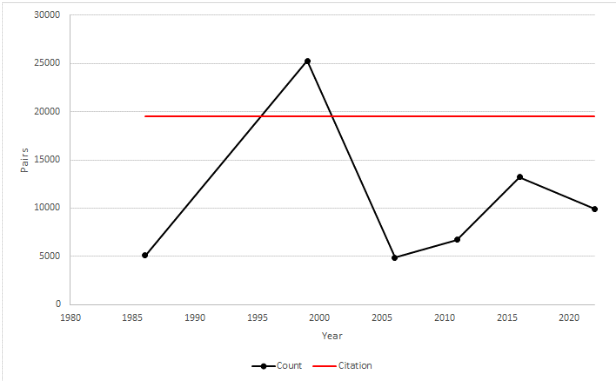
958. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage), colony count data was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-17**).



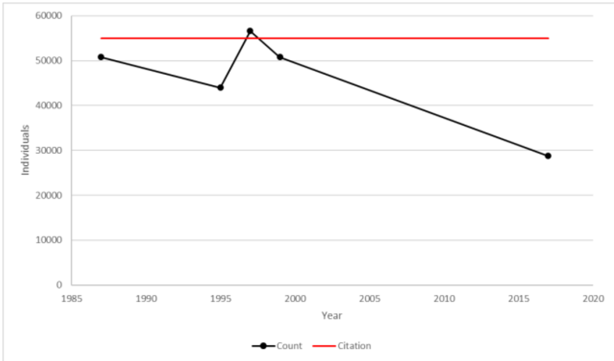
Kittiwake



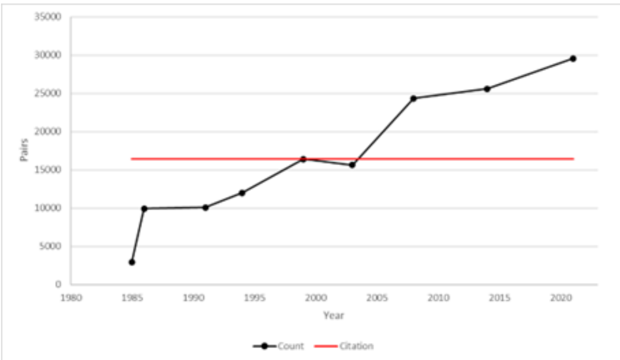
Great skua



Fulmar



Puffin



Gannet

Figure 6-17. Hermaness, Saxa Vord and Valla Field SPA qualifying feature population trends from 1981 - 2022 (citation population size shown by red line).

6.3.15.4 Potential for the Project to impact the site's conservation objectives

959. The Hermaness, Saxa Vord and Valla Field SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **puffin** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **gannet** qualifying feature, during the breeding and non-breeding season;
- Collision impacts from the offshore Project during operation on the **great skua** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

960. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

961. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

962. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.15.5 Assessment of predicted impacts for Project alone and in-combination

6.3.15.5.1 Kittiwake

963. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Hermaness, Saxa Vord and Valla Field SPA population is presented in **Table 6-115**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-115. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the Hermaness, Saxa Vord and Valla Field SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.03	0.00	0.03	0.01
Mortality - Autumn migration (BDMPS)	0.01	0.00	0.01	0.00
Mortality - Spring migration (BDMPS)	0.02	0.00	0.02	0.01
Annual Project alone mortality (collision + displacement)*	0.03		0.04	
Percentage point change in annual adult survival rate	0.01%		0.01%	
Annual in-combination mortality excl Berwick Bank	1.05		1.12	
Percentage point change in annual adult survival rate	0.30%		0.32%	
Annual in-combination mortality incl Berwick Bank	1.26		1.42	
Percentage point change in annual adult survival rate	0.35%		0.40%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

964. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

965. Change in adult survival rate due to in-combination impacts did exceed 0.02% but, as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

966. Project alone mortality was estimated to be 0.04 birds per annum. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to recover and be restored in the long-term.

967. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the Hermaness, Saxa Vord and Valla Field SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.15.5.2 Great skua

968. Predicted great skua collision mortality, by season, and change to annual adult survival rate apportioned to the Fair Isle SPA population is presented in **Table 6-116**. In-combination impacts from other OWFs apportioned no great skua mortality to this SPA, so no further assessment of in-combination impacts is required.

Table 6-116. Estimated adult great skua Project alone collision seasonal and annual mortalities (birds per annum) apportioned to the Hermaness, Saxa Vord and Valla Field SPA and change in baseline annual adult survival rate.
See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

GREAT SKUA	Collision (WCS)
Mortality - Breeding season (NatureScot)	0.00
Mortality - Non-breeding season (NatureScot)	0.02
Mortality - Autumn migration (BDMPS)	0.00
Mortality - Winter (BDMPS)	0.00
Mortality - Spring migration (BDMPS)	0.02
Annual Project alone mortality* (collisions)	0.02
Percentage point change in annual adult survival rate	<0.01%

** Sum of collision mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

969. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination impacts from other OWFs on this feature were found.

970. Great skua feature condition was Unfavourable Declining, when last assessed in June 2023. Great skua populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). Counts of great skuas at Hermaness, Saxa Vord and Valla Field SPAin 2023 found a 77% decrease in population size to 224 Apparently Occupied Territories (Tremlett *et al.*, 2024). This is well below the citation population size of 788 pairs[39].

971. Whilst this population has undergone a recent decline due to HPAI impacts, the very small Project alone impacts and the absence of any in-combination impacts will not prevent or reduce the potential for this feature to recover and to be restored in the long-term.

972. Consequently, a conclusion of no AEoSI was reached for the great skua feature of the Hermaness, Saxa Vord and Valla Field SPA, from collision impacts from the Project alone and in-combination.

[39] SiteLink - Hermaness, Saxa Vord and Valla Field SPA (nature.scot)

6.3.15.5.3 Puffin

973. Predicted puffin displacement mortality, by season, and change to annual adult survival rate apportioned to the Hermaness, Saxa Vord and Valla Field SPA population is presented in **Table 6-117**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

974. Note, almost all breeding season Project alone puffin mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-117. Estimated adult puffin Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the Hermaness, Saxa Vord and Valla Field SPA and change in baseline annual adult survival rate.
See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

PUFFIN	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.39	1.18
Mortality - Non-breeding season (BDMPS)	0.39	1.18
Annual Project alone mortality* (displacement)	0.39	1.18
Percentage point change in annual adult survival rate	<0.01	0.01%
Annual in-combination mortality excl Berwick Bank	4.79	14.31
Percentage point change in annual adult survival rate	0.017%	0.05%
Annual in-combination mortality incl Berwick Bank	6.43	19.21
Percentage point change in annual adult survival rate	0.022%	0.07%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

975. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

976. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

977. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

978. **Table 6-118** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the puffin population at Hermaness, Saxa Vord and Valla Field SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

979. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-118. Hermaness, Saxa Vord and Valla Field SPA: Puffin PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	0.4	0.00001364091	25	1.0000	1.0000	0.0008	0.9983	1.0015	1.0003	0.9998	0.0213	0.9575	1.0401	49.6	50.4
Project alone High	1.2	0.00004092263	25	1.0000	1.0000	0.0008	0.9983	1.0014	0.9992	0.9986	0.0203	0.9572	1.0367	49.6	50.4
Incomb Low ex. BB	4.8	0.00016669464	25	0.9998	0.9998	0.0008	0.9982	1.0014	0.9944	0.9950	0.0206	0.9541	1.0372	49.3	50.8
Incomb High ex. BB	14.3	0.00049786693	25	0.9994	0.9994	0.0008	0.9978	1.0010	0.9843	0.9846	0.0207	0.9445	1.0262	48.0	51.3
Incomb Low inc. BB	6.4	0.00022348305	25	0.9997	0.9997	0.0008	0.9981	1.0013	0.9928	0.9929	0.0220	0.9500	1.0355	49.1	50.8
Incomb High inc. BB	19.2	0.00066823216	25	0.9992	0.9992	0.0008	0.9975	1.0007	0.9796	0.9794	0.0207	0.9394	1.0201	47.9	51.8
Project alone Low	0.4	0.00001364091	35	1.0000	1.0000	0.0008	0.9984	1.0016	1.0000	1.0004	0.0290	0.9457	1.0601	49.7	50.4
Project alone High	1.2	0.00004092263	35	1.0000	0.9999	0.0008	0.9984	1.0014	0.9980	0.9980	0.0275	0.9439	1.0534	49.7	50.1
Incomb Low ex. BB	4.8	0.00016669464	35	0.9998	0.9998	0.0008	0.9983	1.0012	0.9928	0.9923	0.0271	0.9390	1.0445	49.5	50.4
Incomb High ex. BB	14.3	0.00049786693	35	0.9994	0.9994	0.0008	0.9980	1.0010	0.9796	0.9797	0.0276	0.9305	1.0356	47.6	52.3
Incomb Low inc. BB	6.4	0.00022348305	35	0.9997	0.9997	0.0008	0.9983	1.0013	0.9909	0.9904	0.0278	0.9380	1.0466	49.4	51.0
Incomb High inc. BB	19.2	0.00066823216	35	0.9992	0.9992	0.0008	0.9976	1.0006	0.9728	0.9719	0.0280	0.9193	1.0235	48.2	52.2
Project alone Low	0.4	0.00001364091	50	1.0000	1.0000	0.0008	0.9984	1.0017	1.0000	1.0021	0.0428	0.9225	1.0899	49.6	50.5
Project alone High	1.2	0.00004092263	50	1.0000	1.0000	0.0008	0.9985	1.0016	0.9985	1.0001	0.0425	0.9216	1.0860	49.7	50.1
Incomb Low ex. BB	4.8	0.00016669464	50	0.9998	0.9998	0.0009	0.9982	1.0016	0.9916	0.9926	0.0433	0.9094	1.0846	49.0	51.2
Incomb High ex. BB	14.3	0.00049786693	50	0.9996	0.9996	0.0008	0.9980	1.0013	0.9782	0.9797	0.0407	0.9027	1.0646	48.6	52.3
Incomb Low inc. BB	6.4	0.00022348305	50	0.9998	0.9998	0.0008	0.9983	1.0014	0.9888	0.9894	0.0408	0.9167	1.0731	48.5	50.8
Incomb High inc. BB	19.2	0.00066823216	50	0.9995	0.9995	0.0008	0.9978	1.0011	0.9735	0.9734	0.0412	0.8916	1.0597	47.6	52.1

980. Predicted Project alone impacts on the puffin population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

981. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, including Berwick Bank impacts, was 0.9992 (95% c.i. 0.9976-1.0006) (**Table 6-118**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.08%. This very small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the puffin population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Additionally, the Project contributed a mortality of only 1.2 birds per annum to the in-combination total of 19 birds per annum (including Berwick Bank impacts, worst case scenario).

982. The puffin feature condition was Unfavourable Recovering, when last assessed in June 2019. Population size at this colony decreased by 43% between the two seabird censuses, Seabird 2000 and Seabirds Count AOB (Apparently Occupied Burrows) (Burnell *et al.*, 2023). There is no evidence of puffin populations being impacted by the HPAI epidemic and no additional counts of puffins at Hermaness, Saxa Vord and Valla Field SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

983. Whilst the puffin population at Hermaness, Saxa Vord and Valla Field SPA has substantially declined, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any future declines that might occur and will not prevent or reduce the potential for this population to be restored in the long-term.

984. Consequently, a conclusion of no AEoSI was reached for the puffin feature of the Hermaness, Saxa Vord and Valla Field SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.15.5.4 Gannet

985. Predicted gannet collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Hemaness, Saxa Vord and Valla Field SPA population is presented in **Table 6-119**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

986. Note, almost all breeding season Project alone gannet mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-119. Estimated adult gannet Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the Hermaness, Saxa Vord and Valla Field SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

GANNET	Collision (WCS)	Low Displacement (70%/1%)	Collision (WCS)	High Displacement (70%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.92	0.95	0.92	2.86
Mortality - Autumn migration (BDMPS)	0.68	0.82	0.68	2.45
Mortality - Spring migration (BDMPS)	0.24	0.13	0.24	0.40
Annual Project alone mortality (collision + displacement)*	1.88		3.78	
Percentage point change in annual adult survival rate	0.003%		0.006%	
Annual in-combination mortality excl. Berwick Bank	119.80		163.30	
Percentage point change in annual adult survival rate	0.20%		0.27%	
Annual in-combination mortality incl. Berwick Bank	122.02		165.52	
Percentage point change in annual adult survival rate	0.21%		0.28%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

987. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

988. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

989. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

990. **Table 6-120** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the gannet population at Hermaness, Saxa Vord and Valla Field SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of

WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

991. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-120. Hermaness, Saxa Vord and Valla Field SPA: Gannet PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	1.9	0.00003173843	25	1.0000	1.0000	0.0003	0.9993	1.0006	0.9987	0.9989	0.0087	0.9826	1.0158	49.1	50.9
Project alone CRM+High	3.8	0.00006393400	25	0.9999	0.9999	0.0003	0.9993	1.0005	0.9980	0.9981	0.0084	0.9821	1.0143	49.2	51.0
Incomb CRM+Low ex. BB	119.8	0.00202624334	25	0.9976	0.9976	0.0003	0.9970	0.9983	0.9400	0.9401	0.0084	0.9238	0.9558	36.9	64.4
Incomb CRM+High ex. BB	163.3	0.00276197774	25	0.9968	0.9968	0.0003	0.9961	0.9975	0.9196	0.9197	0.0084	0.9040	0.9358	32.0	69.4
Incomb CRM+Low inc. BB	122.0	0.00206387255	25	0.9976	0.9976	0.0003	0.9970	0.9983	0.9389	0.9392	0.0082	0.9227	0.9556	36.7	64.0
Incomb CRM+High inc. BB	165.5	0.00279960695	25	0.9967	0.9967	0.0003	0.9961	0.9974	0.9184	0.9183	0.0080	0.9020	0.9339	31.3	69.2
Project alone CRM+Low	1.9	0.00003173843	35	1.0000	1.0000	0.0003	0.9994	1.0005	0.9985	0.9987	0.0101	0.9793	1.0181	49.6	50.7
Project alone CRM+High	3.8	0.00006393400	35	0.9999	0.9999	0.0003	0.9994	1.0005	0.9971	0.9972	0.0098	0.9784	1.0169	49.7	50.1
Incomb CRM+Low ex. BB	119.8	0.00202624334	35	0.9976	0.9976	0.0003	0.9971	0.9982	0.9180	0.9180	0.0096	0.8998	0.9359	32.8	64.7
Incomb CRM+High ex. BB	163.3	0.00276197774	35	0.9968	0.9968	0.0003	0.9962	0.9974	0.8902	0.8902	0.0093	0.8722	0.9090	28.4	70.1
Incomb CRM+Low inc. BB	122.0	0.00206387255	35	0.9976	0.9976	0.0003	0.9970	0.9981	0.9167	0.9167	0.0094	0.8984	0.9343	33.2	64.5
Incomb CRM+High inc. BB	165.5	0.00279960695	35	0.9967	0.9967	0.0003	0.9961	0.9972	0.8887	0.8884	0.0090	0.8700	0.9056	28.0	70.0
Project alone CRM+Low	1.9	0.00003173843	50	1.0000	1.0000	0.0002	0.9995	1.0004	0.9985	0.9986	0.0114	0.9761	1.0214	49.9	50.4
Project alone CRM+High	3.8	0.00006393400	50	0.9999	0.9999	0.0002	0.9995	1.0004	0.9970	0.9973	0.0114	0.9740	1.0191	49.2	50.7
Incomb CRM+Low ex. BB	119.8	0.00202624334	50	0.9983	0.9983	0.0002	0.9979	0.9987	0.9175	0.9173	0.0111	0.8952	0.9380	36.6	63.9
Incomb CRM+High ex. BB	163.3	0.00276197774	50	0.9977	0.9977	0.0002	0.9973	0.9981	0.8893	0.8893	0.0106	0.8683	0.9099	32.1	68.8
Incomb CRM+Low inc. BB	122.0	0.00206387255	50	0.9983	0.9983	0.0002	0.9978	0.9987	0.9159	0.9160	0.0109	0.8952	0.9368	36.2	64.1
Incomb CRM+High inc. BB	165.5	0.00279960695	50	0.9977	0.9977	0.0002	0.9972	0.9981	0.8877	0.8875	0.0105	0.8656	0.9083	31.1	69.1

992. Predicted Project alone impacts on the gannet population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

993. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9967 (95% c.i. 0.9961-0.9972) (**Table 6-120).** The predicted reduction in population growth rate under this highest impact worst case scenario was 0.33%. This predicted small change to population growth rate indicates that the gannet population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of only 4 birds per annum to the in-combination total of 166 birds per annum (including Berwick Bank impacts, worst case scenario).

994. The gannet feature condition was Favourable Maintained, when last assessed in June 2023. The Hermaness, Saxa Vord and Valla Field SPA colony, like many gannet populations, has undergone a large increase and is above citation population size of 16,400 pairs. Population size at this colony increased by 89% between the two seabird censuses, Seabird 2000 and Seabirds Count, to 29,562 AOS/AON (Burnell *et al.*, 2023). Gannet populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The Hermaness, Saxa Vord and Valla Field SPA gannet population had declined by 37% to 18,739 AON when counted in 2023 (Tremlett *et al.,* 2024) but, despite this, the population remains above citation population size.

995. The Project alone and in-combination impacts on the gannet Hermaness, Saxa Vord and Valla Field SPA population are predicted to be small they will not exacerbate any future declines which may occur and will not prevent or reduce the potential for this population to be maintained.

996. Consequently, a conclusion of no AEoSI was reached for the gannet feature of the Hermaness, Saxa Vord and Valla Field SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.15.5.5 Fulmar

997. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the Hermaness, Saxa Vord and Valla Field SPA population is presented in **Table 6-121** No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features.

Table 6-121. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities (birds per annum) apportioned to the Hermaness, Saxa Vord and Valla Field SPA and change in baseline annual adult survival rate

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.006	0.017
Mortality - Non-breeding season (NatureScot)	0.168	0.503
Mortality - Autumn migration (BDMPS)	0.064	0.193
Mortality - Winter (BDMPS)	0.028	0.084
Mortality - Spring migration (BDMPS)	0.075	0.226
Annual Project alone mortality* (displacement)	0.173	0.520
Percentage point change in annual adult survival rate	0.001%	0.002%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

998. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination assessment was undertaken for fulmar.

999. Fulmar feature condition is Unfavourable Declining, when last assessed in June 2022. There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmar at Hermaness, Saxa Vord and Valla Field SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

1000. The very small predicted mortality from Project impacts on this population will not prevent or reduce the potential for this feature to recover and be restored, in the long term.

1001. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the Hermaness, Saxa Vord and Valla Field SPA, from displacement and barrier impacts from the Project alone. No in-combination assessment was undertaken for fulmar.

6.3.15.6 Conclusions

1002. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the of **Hermaness, Saxa Vord and Valla Field SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1003. A conclusion of **no AEoSI** was reached for the **great skua** feature of the of **Hermaness, Saxa Vord and Valla Field SPA**, from collision impacts from the **Project alone** and **in-combination** with other OWFs.

1004. A conclusion of **no AEoSI** was reached for the **puffin** feature of the of **Hermaness, Saxa Vord and Valla Field SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1005. A conclusion of **no AEoSI** was reached for the **gannet** feature of the of **Hermaness, Saxa Vord and Valla Field SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1006. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the of **Hermaness, Saxa Vord and Valla Field SPA**, from displacement and barrier impacts from the **Project alone**.

1007. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, great skua, puffin, gannet and fulmar, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Hermaness, Saxa Vord and Valla Field SPA**.

1008. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Hermaness, Saxa Vord and Valla Field SPA** was reached.

6.3.16 Hoy SPA

6.3.16.1 Site Description

1009. The Hoy SPA was classified on 7 December 2000, with marine extension classified on 25 September 2009, due to its populations of breeding seabirds. The site is approximately 25 km east of the Project.

1010. Hoy is a mountainous island at the south-western end of the Orkney archipelago. Hoy SPA covers the northern and western two-thirds of Hoy Island, which is formed of Old Red Sandstone and contains Orkney's highest hills, and adjacent coastal waters. The SPA supports an extremely diverse mixture of mire, heath and alpine vegetation and Britain's most northerly native woodland. These upland areas and the high sea cliffs at the coast support an important assemblage of moorland breeding birds and breeding seabirds.

1011. The boundary of Hoy SPA overlaps with that of Hoy SSSI, and the seaward extension extends approximately 2km into the marine environment to include the seabed, water column and surface. This site also has functional connectivity with the Scapa Flow SPA, with breeding red-throated divers from Hoy SPA foraging in Scapa Flow.

6.3.16.2 Conservation Objectives for the SPA

1012. The conservation objectives of the Hoy SPA are:

- 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
- 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.

6.3.16.3 Qualifying features

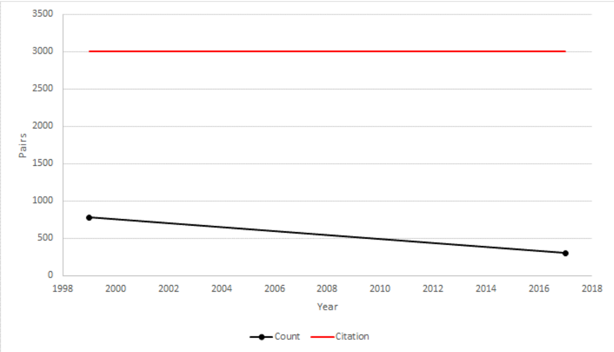
1013. The qualifying features of the SPA are presented below in **Table 6-122**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

Table 6-122. Qualifying interests and condition for the Hoy SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

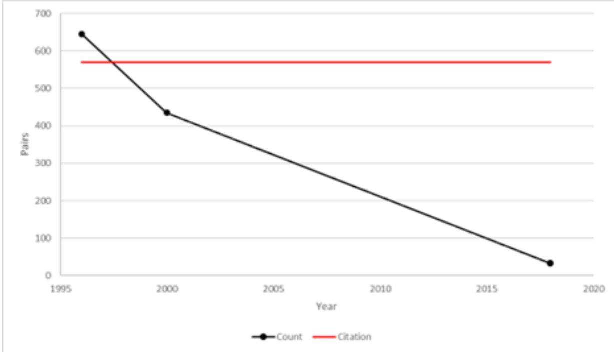
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake* (breeding)	3,000 pairs, 0.6% of the GB population	266 pairs	Unfavourable Declining	10 June 2017	Red
Great black-backed gull* (breeding)	570 pairs, 3% of the GB population	32 pairs	Unfavourable Declining	1 June 2023	Amber
Great skua (breeding)	1,900 pairs, 14% of the world biogeographic population	1,405 pairs	Unfavourable Declining	1 June 2023	Amber
Arctic skua* (breeding)	59 pairs, 2% of the GB population	7 pairs	Unfavourable Declining	8 July 2019	Red
Guillemot* (breeding)	13,400 pairs, 2% of the GB population	9,246 individuals	Unfavourable No change	10 June 2017	Amber
Puffin* (breeding)	3,500 pairs, 0.7% of the GB population	430 pairs	Unfavourable Declining	29 June 2004	Red
Fulmar* (breeding)	35,000 pairs, 6% of the GB population	20,541 pairs	Unfavourable No change	10 June 2017	Amber
Red-throated diver (breeding)	58 territories, 6% of the GB population	n/a	Favourable Maintained	30 August 2007	Green
Peregrine (breeding)	6 pairs, 0.5% of the GB population	n/a	Favourable Maintained	29 May 2013	Green
Seabird assemblage (breeding)	regularly supports 120,000 seabirds including nationally important populations	n/a	Unfavourable Declining	8 July 2019	n/a

1014. Hoy SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 120,000 seabirds including nationally important populations of the following species: Atlantic puffin, black-legged kittiwake, Arctic skua, Northern fulmar, common guillemot, great skua and great black-backed gull.

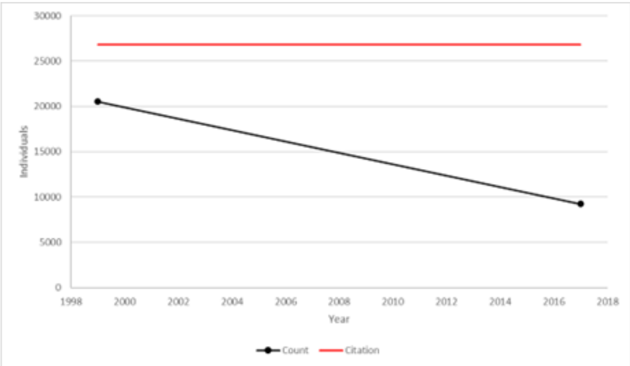
1015. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) count data was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-18**).



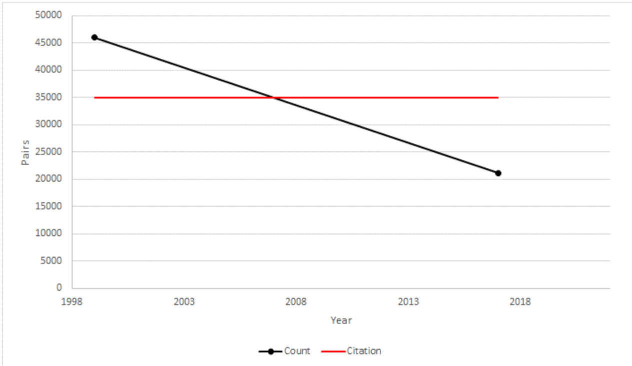
Kittiwake



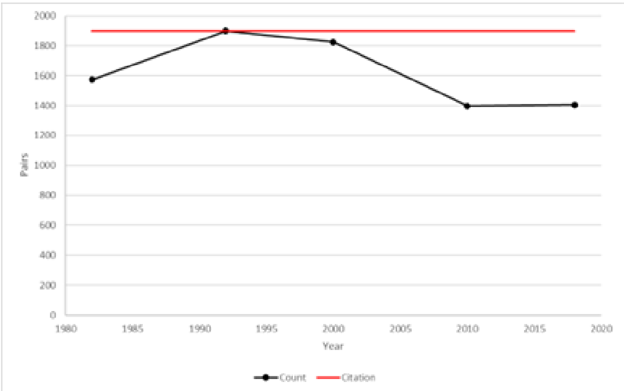
Great black-backed gull



Guillemot



Fulmar



Great skua

Figure 6-18. Hoy SPA qualifying feature population trends from 1981 - 2022 (citation population size shown by red line). No plot for puffin is provided due to no recent counts for this colony.

1016. Puffin counts in the SMP database are only available from 2016/2017. Puffin on Hoy SPA nest in cliffs and are therefore very hard to survey and there is considerable uncertainty in the current, and previous, population sizes. Hughes et al. (2018) noted counts of individual puffins around Hoy SPA were 6,726 in 1985-88, only 417 in 1998 – 2002 and about 3,000 in 2016. The citation population size is 3,500 pairs. No plot for puffin is provided due to the high uncertainty around the counts.

6.3.16.4 Potential for the Project to impact the site's conservation objectives

1017. The Hoy SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from vessel activity outwith the offshore Project area during construction on the **red-throated diver** qualifying feature, during the breeding season;
- Collision impacts from the offshore Project during operation on the **great black-backed gull** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **guillemot** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **puffin** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Collision impacts from the offshore Project during operation on the **great skua** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

1018. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

1019. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

1020. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives. Note, the functionally connected site of Scapa Flow SPA, which is used by red-throated divers for foraging and other maintenance activities during the breeding season, was screened in for disturbance/displacement of breeding red-throated divers by vessels transiting to/from the port of Scapa Deep Water Quay during construction. If the conservation objectives of Scapa Flow SPA are undermined, with respect to the red-throated diver qualifying feature, there may be a knock-on effect on the Hoy SPA feature too. However, this would undermine the above conservation objective for the Hoy SPA rather than any other of the objectives.

6.3.16.5 Assessment of predicted impacts for Project alone and in-combination

1021. Other reasonably foreseeable projects have not yet submitted an application and may also impact some of the qualifying features of the Hoy SPA. These are summarised in **Table 6-123**.

Table 6-123 In-combination project with the potential to impact the Hoy SPA that have not yet submitted an application.

SPA + qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Atlantic puffin						
Black-legged kittiwake						Y
Common guillemot						Y
Great black-backed gull						Y
Northern fulmar						Y

1022. The predicted impacts from these projects have not been considered in the quantitative assessment of the impacts from the Project in-combination with other reasonably foreseeable projects, as it is assumed that these projects will need to consider this Project in their in-combination assessments.

6.3.16.5.1 Red-throated diver

1023. The red-throated diver qualifying feature of the Hoy SPA could be affected if divers from Hoy SPA are disturbed/displaced while foraging or undertaking other key maintenance behaviours in Scapa Flow. At this stage the Project has not confirmed which ports/harbours will be used during construction and operation but if the Project decides to use the port of Scapa Deep Water Quay for construction, vessels could transit through Scapa Flow on transit to/from the offshore Project area. This impact pathway could impact both the red-throated diver feature of the Scapa Flow SPA and the Hoy SPA. The impacts of vessels transiting through Scapa Flow on the red-throated diver feature of that SPA is assessed in detail, under the Scapa Flow SPA account (see **Section 6.3.25**).

1024. If vessel activity in Scapa Flow causes disturbance and displacement of red-throated divers, this might reduce their ability to forage for themselves and/or to provision their chicks. Consequently, vessel activity in Scapa Flow associated with Scapa Deep Water Quay is also an impact pathway for LSE for this feature of Hoy SPA.

1025. Red-throated diver distribution in Scapa Flow during the breeding season is concentrated in shallow inshore areas around Hoy and the western end of mainland Orkney, in the vicinity of their breeding grounds. If Scapa Deep Water Quay is used as a construction port for the Project, vessel activity would be concentrated along existing transit routes through the middle of Scapa Flow. There is virtually no overlap between potential vessel routes that Project vessels would use and the red-throated diver distribution. Consequently, there will be no or very little disturbance/displacement to the breeding red-throated diver feature of Scapa Flow SPA. In turn, this also means no impacts on the long-term viability of the red-throated diver feature of the Hoy SPA.

1026. A conclusion of no AEoSI was reached for disturbance/displacement by vessels during Project construction for the red-throated diver feature of Scapa Flow SPA and consequently, no

AEoSI is also concluded for the red-throated diver feature of the Hoy SPA, both from Project alone and in-combination impacts.

6.3.16.5.2 Kittiwake

1027. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Hoy SPA population is presented in **Table 6-124**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-124. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the Hoy SPA and change in baseline annual adult survival rate.
*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.17	0.03	0.17	0.09
Mortality - Non-breeding season (NatureScot)	0.02	0.00	0.02	0.02
Mortality - Autumn migration (BDMPS)	0.01	0.00	0.01	0.00
Mortality - Spring migration (BDMPS)	0.02	0.00	0.02	0.01
Annual Project alone mortality (collision + displacement)*	0.22		0.30	
Percentage point change in annual adult survival rate	0.04%		0.06%	
Annual in-combination excl. Berwick Bank	1.36		1.53	
Percentage point change in annual adult survival rate	0.26%		0.29%	
Annual in-combination incl. Berwick Bank	1.61		1.89	
Percentage point change in annual adult survival rate	0.30%		0.36%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1028. As change in adult survival rate from the Project alone impacts exceeded the 0.02% threshold, a PVA was required for Project alone impacts.

1029. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was also required to assess in-combination impacts.

1030. **Table 6-125** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and

Q-IMP) from the PVA model run for the kittiwake population at Hoy SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1031. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-125. Hoy SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	0.2	0.0004233359	25	0.9996	0.9995	0.0048	0.9900	1.0085	0.9873	0.9931	0.1261	0.7658	1.2416	49.8	50.4
Project alone CRM+High	0.3	0.0005617622	25	0.9990	0.9991	0.0046	0.9901	1.0083	0.9734	0.9839	0.1208	0.7570	1.2458	49.1	50.6
Incomb CRM+Low ex. BB	1.4	0.0025575761	25	0.9969	0.9971	0.0046	0.9881	1.0064	0.9239	0.9331	0.1163	0.7234	1.1947	42.4	56.3
Incomb CRM+High ex. BB	1.5	0.0028729555	25	0.9965	0.9965	0.0046	0.9873	1.0058	0.9144	0.9190	0.1171	0.7084	1.1576	40.3	58.9
Incomb CRM+Low inc. BB	1.6	0.0030288776	25	0.9964	0.9964	0.0044	0.9877	1.0048	0.9092	0.9167	0.1088	0.7290	1.1450	41.2	59.1
Incomb CRM+High inc. BB	1.9	0.0035580455	25	0.9958	0.9958	0.0046	0.9874	1.0050	0.8975	0.9034	0.1121	0.7037	1.1412	38.5	60.2
Project alone CRM+Low	0.2	0.0004233359	35	0.9995	0.9995	0.0041	0.9913	1.0078	0.9813	0.9924	0.1490	0.7285	1.3176	48.6	52.5
Project alone CRM+High	0.3	0.0005617622	35	0.9992	0.9991	0.0039	0.9916	1.0066	0.9663	0.9787	0.1421	0.7376	1.2675	48.2	53.0
Incomb CRM+Low ex. BB	1.4	0.0025575761	35	0.9969	0.9970	0.0040	0.9891	1.0047	0.8953	0.9052	0.1337	0.6752	1.1802	41.2	60.3
Incomb CRM+High ex. BB	1.5	0.0028729555	35	0.9965	0.9965	0.0039	0.9887	1.0042	0.8821	0.8919	0.1305	0.6660	1.1689	41.0	60.4
Incomb CRM+Low inc. BB	1.6	0.0030288776	35	0.9964	0.9963	0.0038	0.9888	1.0037	0.8741	0.8836	0.1250	0.6594	1.1495	40.6	60.5
Incomb CRM+High inc. BB	1.9	0.0035580455	35	0.9956	0.9958	0.0040	0.9883	1.0039	0.8545	0.8677	0.1311	0.6468	1.1557	37.8	62.5
Project alone CRM+Low	0.2	0.0004233359	50	0.9998	0.9997	0.0035	0.9934	1.0066	0.9828	1.0001	0.1833	0.7098	1.3933	49.5	50.8
Project alone CRM+High	0.3	0.0005617622	50	0.9994	0.9993	0.0034	0.9921	1.0062	0.9630	0.9812	0.1768	0.6590	1.3738	48.3	51.9
Incomb CRM+Low ex. BB	1.4	0.0025575761	50	0.9979	0.9979	0.0035	0.9908	1.0048	0.8964	0.9096	0.1666	0.6152	1.2960	41.7	59.0
Incomb CRM+High ex. BB	1.5	0.0028729555	50	0.9976	0.9976	0.0035	0.9906	1.0048	0.8850	0.8972	0.1665	0.6072	1.2611	40.6	59.5
Incomb CRM+Low inc. BB	1.6	0.0030288776	50	0.9973	0.9973	0.0034	0.9906	1.0041	0.8733	0.8859	0.1560	0.6192	1.2456	39.7	60.4
Incomb CRM+High inc. BB	1.9	0.0035580455	50	0.9971	0.9970	0.0036	0.9897	1.0037	0.8624	0.8727	0.1672	0.5795	1.2147	39.5	61.4

1032. The C-PGR for Project alone impacts after 35 years for the highest impact scenario of high displacement and WCS collision was 0.9991 (95% c.i. 0.9916-1.0066) (**Table 6-125**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.09%. This very small change indicates that the PVA trajectories with Project-alone impacts are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the kittiwake population will be of a similar size after 35 years, in the presence of Project impacts, as would be expected in the absence of Project impacts.

1033. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9958 (95% c.i. 0.9883-1.0039) (**Table 6-125**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.42%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the kittiwake population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Additionally, the Project contributed a mortality of only 0.3 birds per annum to the in-combination total of 1.9 birds per annum (including Berwick Bank impacts, worst case scenario).

1034. The kittiwake population at this SPA is well below the citation population size of 3,000 pairs[40] and feature condition was Unfavourable Declining, when last assessed in June 2017. However, the population appears to have been stable over the last 20 years. Population size at this colony increased by 66% between the two seabird censuses, Seabird 2000 and Seabirds Count, to 266 AON (Burnell *et al.*, 2023). Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). Kittiwakes on Hoy SPA were not counted in 2023 and since kittiwake population status following HPAI varied considerably, it is not possible to infer whether this population has remained stable or declined due to HPAI.

1035. The Project alone and in-combination impacts on this population were predicted to be sufficiently small to not exacerbate any future declines and to not prevent or reduce the potential for this population to recover and be restored in the long term.

1036. Consequently, a conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Hoy SPA**, from collision and displacement impacts from the **Project alone and in-combination** with other OWFs.

6.3.16.5.3 Great black-backed gull

1037. Predicted great black-backed gull collision mortality, by season, and change to annual adult survival rate apportioned to the Hoy SPA population is presented in **Table 6-126.** NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts (letter from NatureScot to the Project, dated 3 June 2024). Berwick Bank Wind Farm did not undertake a

[40] SiteLink - Hoy SPA (nature.scot)

quantitative assessment for great black-backed gull because this species was rarely seen within their offshore development area. Therefore, only one set of in-combination impacts are presented.

Table 6-126. Estimated adult great black-backed gull Project alone and in-combination collision seasonal and annual mortalities (birds per annum) apportioned to the Hoy SPA and change in baseline annual adult survival rate.
See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

GREAT BLACK-BACKED GULL	Collision (WCS)
Mortality - Breeding season (NatureScot)	0.09
Mortality - Non-breeding season (NatureScot)	0.01
Mortality - Non-breeding season (BDMPS)	0.01
Annual Project alone mortality* (collision)	0.10
Percentage point change in annual adult survival rate	0.16%
Annual in-combination mortality	1.46
Percentage point change in annual adult survival rate	2.28%

** Sum of collision mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1038. As change in adult survival rate from the Project alone impacts exceeded the 0.02% threshold, a PVA was required for Project alone impacts.

1039. Change in adult survival rate due to in-combination impacts did exceed 0.02% but, as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

1040. **Table 6-127** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the great black-backed gull population at Hoy SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1041. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-127. Hoy SPA: Great black-backed gull PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM	0.1	0.001613343	25	0.9981	0.9982	0.0042	0.9901	1.0064	0.9545	0.9582	0.1089	0.7641	1.1984	45.4	55.0
Project alone CRM	0.1	0.001613343	35	0.9982	0.9982	0.0031	0.9923	1.0043	0.9366	0.9420	0.1087	0.7509	1.1856	44.5	56.3
Project alone CRM	0.1	0.001613343	50	0.9987	0.9987	0.0022	0.9945	1.0031	0.9374	0.9422	0.1085	0.7501	1.1864	45.9	53.0

1042. The C-PGR for Project alone impacts after 35 years for the highest impact scenario of WCS collision was 0.9982 (95% c.i. 0.9923-1.0043) (**Table 6-127**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.18%. This very small change indicates that the PVA trajectories with Project-alone impacts are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the great black-backed gull population will be of a similar size after 35 years, in the presence of Project impacts, as would be expected in the absence of Project impacts.

1043. The great black-backed gull population at this SPA is well below the citation population size of 570 pairs and feature condition was Unfavourable Declining, when assessed in June 2023. The population is now greatly reduced, at just 32 pairs from Seabirds Count (Burnell *et al.*, 2023). Great black-backed gull populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The part of the SPA that was counted in 2023 showed a 44% decline, compared to the Seabirds Count population estimate (Tremlett *et al.*,2023).

1044. The great black-backed gull feature of the Hoy SPA has substantially declined. However, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any further declines and will not prevent or reduce the potential for this population to recover and to be restored in the long term.

1045. Consequently, a conclusion of **no AEoSI** was reached for the **great black-backed gull** feature of the **Hoy SPA**, from collision impacts from the **Project alone and in-combination** with other OWFs.

6.3.16.5.4 Great skua

1046. Predicted great skua collision mortality, by season, and change to annual adult survival rate apportioned to the Hoy SPA population is presented in **Table 6-128**. In-combination impacts from other OWFs apportioned no great skua mortality to this SPA, with the exception of Berwick Bank Wind Farm which apportioned a mortality of 0.05 great skuas per annum to Hoy SPA. See **Section 3.8** of **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on apportioning in-combination impacts to the great skua feature at Hoy SPA.

Table 6-128. Estimated adult great skua Project alone collision seasonal and annual mortalities (birds per annum) apportioned to the Hoy SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts for more details on calculation of mortalities and changes to survival rate.

GREAT SKUA	Collision (WCS)
Mortality - Breeding season (NatureScot)	0.022
Mortality - Non-breeding season (NatureScot)	0.030
Mortality - Autumn migration (BDMPS)	0.005
Mortality - Winter (BDMPS)	0
Mortality - Spring migration (BDMPS)	0.025
Annual Project alone mortality* (collision)	0.052
Percentage point change in annual adult survival rate	0.002%

GREAT SKUA	Collision (WCS)
In-combination mortality (Project + Berwick Bank)	0.12
Percentage point change in annual adult survival rate	0.004%

** Sum of collision mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1047. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1048. Change in adult survival rate due to in-combination impacts did not exceed 0.02% and, as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

1049. Note, change in annual adult survival rate was calculated against the Seabirds Count population estimate (Burnell *et al.*, 2023). However, mortality is sufficiently small that even if change in adult survival rate was calculated using the counts of the greatly reduced population size from 2023 (Tremlett *et al.*, 2023), the PVA threshold of 0.02% was still not exceeded. See **Table 3-19** of **Section 3.8** in **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts.**

1050. The great skua feature condition was Unfavourable Declining, when last assessed in June 2023 and the population is below the citation population size of 1,900 pairs, which represented 14% of the world biogeographic population at that time[41]. Population size at this colony decreased by 23% between the two seabird censuses, Seabird 2000 and Seabirds Count, to 1,405 AOTs (Burnell *et al.*, 2023). Great skua populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). All the great skua colonies showed a substantial decline when counted in 2023, but the Hoy SPA colony had decreased by 82% to just 257 AOTs (Tremlett *et al.*, 2024).

1051. Whilst this population has undergone a substantial decline recently due to HPAI impacts, the very small Project alone and in-combination impacts will not exacerbate the risk of any further declines and will not prevent or reduce the potential for this feature to recover and to be restored, in the long term.

1052. Consequently, a conclusion of no AEoSI was reached for the great skua feature of the Hoy SPA, from collision impacts from the Project alone and in-combination.

6.3.16.5.5 Guillemot

1053. Predicted guillemot and displacement mortality, by season, and change to annual adult survival rate apportioned to the Hoy SPA population is presented in **Table 6-129**. NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts (letter from NatureScot to the Project, dated 3 June 2024). However, Berwick Bank Wind Farm did not

[41] SiteLink - Hoy SPA (nature.scot)

have connectivity with any of the SPAs with guillemot features, potentially impacted by the Project and so the in-combination assessment does not include any Berwick Bank impacts.

1054. Note, almost all Project alone breeding season guillemot mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-129. Estimated adult guillemot Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the Hoy SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

GUILLEMOT	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.35	1.06
Mortality - Non-breeding season (BDMPS)	0.35	1.06
Annual Project alone mortality* (displacement)	0.35	1.06
Percentage point change in annual adult survival rate	<0.01%	0.01%
Annual in-combination mortality	6.59	17.39
Percentage point change in annual adult survival rate	0.05%	0.14%

**Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1055. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1056. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

1057. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

1058. **Table 6-130** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the guillemot population at Hoy SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population**

scales for Project alone and in-combination impacts includes information on all inputs to this PVA and a plot showing population size over time.

1059. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-130. Hoy SPA: Guillemot PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	0.4	0.000029	25	1.0000	1.0000	0.0005	0.9989	1.0010	0.9994	0.9991	0.0148	0.9691	1.0287	49.5	50.4
Project alone High	1.1	0.000086	25	0.9999	0.9999	0.0005	0.9989	1.0010	0.9969	0.9972	0.0147	0.9695	1.0269	49.4	50.5
Incomb Low	6.6	0.000532	25	0.9994	0.9994	0.0005	0.9983	1.0005	0.9848	0.9846	0.0148	0.9548	1.0147	46.3	52.9
Incomb High	17.4	0.001404	25	0.9984	0.9984	0.0005	0.9974	0.9995	0.9597	0.9598	0.0143	0.9319	0.9885	42.0	59.5
Project alone Low	0.4	0.000029	35	0.9999	1.0000	0.0004	0.9991	1.0008	0.9985	0.9985	0.0165	0.9662	1.0321	49.7	50.2
Project alone High	1.1	0.000086	35	0.9999	0.9999	0.0004	0.9990	1.0008	0.9961	0.9964	0.0162	0.9663	1.0303	49.4	50.8
Incomb Low	6.6	0.000532	35	0.9994	0.9994	0.0004	0.9985	1.0003	0.9786	0.9787	0.0163	0.9474	1.0101	46.2	54.2
Incomb High	17.4	0.001404	35	0.9984	0.9984	0.0005	0.9975	0.9993	0.9444	0.9445	0.0158	0.9126	0.9749	39.7	60.5
Project alone Low	0.4	0.000029	50	1.0000	1.0000	0.0004	0.9993	1.0006	0.9980	0.9983	0.0184	0.9628	1.0357	49.6	50.7
Project alone High	1.1	0.000086	50	0.9999	0.9999	0.0003	0.9993	1.0006	0.9961	0.9964	0.0182	0.9600	1.0318	49.3	51.0
Incomb Low	6.6	0.000532	50	0.9996	0.9996	0.0004	0.9989	1.0003	0.9784	0.9786	0.0188	0.9429	1.0166	45.5	53.7
Incomb High	17.4	0.001404	50	0.9989	0.9989	0.0004	0.9982	0.9996	0.9441	0.9444	0.0177	0.9110	0.9793	40.6	58.8

1060. Predicted Project alone impacts on the guillemot population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

1061. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, was 0.9984 (95% c.i. 0.9975-0.9993) (**Table 6-130**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.16%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the guillemot population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. . Additionally, the Project contributed a mortality of only 1.06 birds per annum to the in-combination total of 17.4 birds per annum (worst case scenario).

1062. The guillemot feature condition was Unfavourable No Change, when last assessed in June 2017. Population size at this colony decreased by 55% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023) and the population is now below citation population size[42]. Guillemot populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The Hoy SPA guillemot population was not counted in 2023 so any change in population size due to HPAI is unknown.

1063. Whilst the guillemot population at the Hoy SPA is substantially smaller than citation population size and could have declined further due to HPAI impacts, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any further declines and will not prevent or reduce the potential for this population to recover and to be restored in the long-term.

1064. Consequently, a conclusion of no AEoSI was reached for the guillemot feature of the Hoy SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.16.5.6 Puffin

1065. Predicted puffin displacement mortality, by season, and change to annual adult survival rate apportioned to the Hoy SPA population is presented in **Table 6-131**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Note, almost all Project alone breeding season puffin mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

[42] SiteLink - Hoy SPA (nature.scot)

Table 6-131. Estimated adult puffin Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the Hoy SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts for more details on calculation of mortalities and changes to survival rate.

PUFFIN	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.06	0.17
Mortality - Non-breeding season (BDMPS)	0.06	0.17
Annual Project alone mortality* (displacement)	0.06	0.17
Percentage point change in annual adult survival rate	<0.01%	0.0198%
Annual in-combination mortality excl. Berwick Bank	1.69	3.76
Percentage point change in annual adult survival rate	0.20%	0.44%
Annual in-combination mortality incl. Berwick Bank	1.94	4.49
Percentage point change in annual adult survival rate	0.22%	0.52%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1066. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1067. Change in adult survival rate due to in-combination impacts did exceed 0.02% but, as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

1068. The Hoy SPA puffin population is particularly difficult to count due to the puffins nesting among rocks rather than burrows in grassy slopes. Consequently, there is considerable uncertainty around the population size of this feature.

1069. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be restored.

1070. Consequently, a conclusion of no AEoSI was reached for the puffin feature of the Hoy SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.16.5.7 Fulmar

1071. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the Hoy SPA population is presented in **Table 6-132**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features.

Table 6-132. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities (birds per annum) apportioned to the Hoy SPA and change in baseline annual adult survival rate

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.974	2.923
Mortality - Non-breeding season (NatureScot)	0.469	1.407
Mortality - Autumn migration (BDMPS)	0.180	0.539
Mortality - Winter (BDMPS)	0.078	0.235
Mortality - Spring migration (BDMPS)	0.211	0.633
Annual Project alone mortality (displacement)	1.444	4.331
Percentage point change in annual adult survival rate	0.004%	0.011%

**Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1072. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination assessment was undertaken for fulmar.

1073. Fulmar feature condition was Unfavourable Maintained, when last assessed in June 2017. There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmar on Hoy SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

1074. The very small predicted mortality from Project impacts on this population will not prevent or reduce the potential for this feature to be maintained.

1075. Consequently, a conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Hoy SPA**, from displacement and barrier effects from the **Project alone**. No in-combination assessment was undertaken for fulmar.

6.3.16.6 Conclusions

1076. A conclusion of **no AEoSI** was reached for the **red-throated diver** feature of the **Hoy SPA**, from disturbance/displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1077. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Hoy SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1078. A conclusion of **no AEoSI** was reached for the **great black-backed gull** feature of the **Hoy SPA**, from collision impacts from the **Project alone** and **in-combination** with other OWFs.

1079. A conclusion of **no AEoSI** was reached for the **great skua** feature of the **Hoy SPA**, from collision impacts from the **Project alone** and **in-combination** with other OWFs.

1080. A conclusion of **no AEoSI** was reached for the **guillemot** feature of the **Hoy SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1081. A conclusion of **no AEoSI** was reached for the **puffin** feature of the **Hoy SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1082. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Hoy SPA**, from displacement and barrier impacts from the **Project alone**.

1083. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, great black-backed gull, great skua, guillemot, puffin and fulmar, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Hoy SPA**.

1084. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Hoy SPA** was reached.

6.3.18 Marwick Head SPA

6.3.18.1 Site Description

1085. The Marwick Head SPA was classified on 16 December 1994, with marine extension classified on 25 September 2009, due to its populations of breeding seabirds. The site is approximately 35 km east of the Project.

1086. The Marwick Head SPA is a 2 km stretch of sea cliffs, and adjacent coastal waters, along the west coast of Orkney Mainland. The cliffs support large colonies of breeding seabirds.

1087. The boundary of the Special Protection Area overlaps the boundary of Marwick Head SSSI, and the seaward extension extends approximately 1 km into the marine environment to include the seabed, water column and surface.

6.3.18.2 Conservation Objectives for the SPA

1088. The conservation objectives of the Marwick Head SPA are:

- 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
- 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.

6.3.18.3 Qualifying features

1089. The qualifying features of the SPA are presented below in **Table 6-133**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

Table 6-133 Qualifying interests and condition for the Marwick Head SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

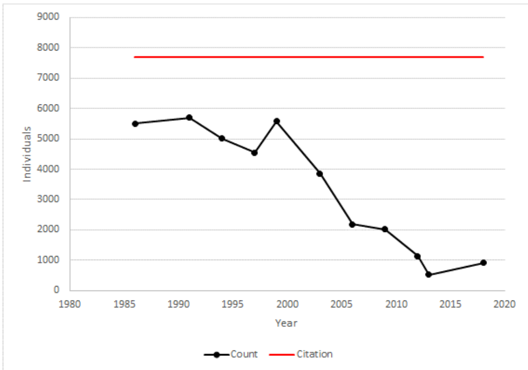
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake (breeding)	7,700 pairs, 2% of the GB population	906 pairs	Unfavourable Recovering	1 June 2023	Red
Guillemot* (breeding)	37,700 individuals 1.1% of the western European biogeographic population	11,985 individuals	Unfavourable No change	1 June 2023	Amber

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Seabird assemblage (breeding)	regularly supports 75,000 seabirds including nationally important populations	n/a	Unfavourable Declining	15 June 2015	n/a

1090. Marwick Head SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 75,000 seabirds including nationally important populations of the following species: black-legged kittiwake and common guillemot.

1091. For both qualifying features for which the site was screened in for further assessment (except the breeding seabird assemblage) count data was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-19**).

Guillemot



Kittiwake

Figure 6-19. Marwick Head SPA qualifying feature population trends from 1981 - 2022 (citation population size shown by red line).

6.3.18.4 Potential for the Project to impact the site's conservation objectives

1092. The Marwick Head SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **guillemot** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

1093. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

1094. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

1095. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.18.5 Assessment of predicted impacts for Project alone and in-combination

1096. An in-combination assessment was undertaken that collated quantitative information on impacts to features of this SPA from published consent applications.

1097. Other reasonably foreseeable projects which have not yet submitted an application may also impact some of the qualifying features of this site. MD-LOT advised (by email, 10 June 2024) that a qualitative assessment of OWF projects for which a Scoping Opinion has been adopted should be undertaken.

1098. OWF projects for which a Scoping Opinion has been adopted and which identified possible impacts from their project on the Marwick Head SPA, in their Scoping Reports, are listed in **Table 6-134**.

Table 6-134. In-combination project with the potential to impact the Marwick Head SPA that have not yet submitted an application. Only features which could be impacted by Project impacts are listed

SPA + qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Black-legged kittiwake						Y
Common guillemot						Y

1099. The predicted impacts from these projects have not been considered in the quantitative assessment of the impacts from the Project in-combination with other reasonably foreseeable projects, as it is assumed that these projects will need to consider this Project in their in-combination assessments.

6.3.18.5.1 Kittiwake

1100. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Marwick Head SPA population is presented in **Table 6-135**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-135. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the Marwick Head SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.26	0.04	0.26	0.15
Mortality - Non-breeding season (NatureScot)	0.03	0.01	0.03	0.02
Mortality - Autumn migration (BDMPS)	0.01	0.00	0.01	0.01
Mortality - Spring migration (BDMPS)	0.02	0.00	0.02	0.01
Annual Project alone mortality (collision + displacement)*	0.35		0.46	
Percentage point change in annual adult survival rate	0.02%		0.03	
Annual in-combination excl. Berwick Bank	1.89		2.13	
Percentage point change in annual adult survival rate	0.10%		0.12	
Annual in-combination incl. Berwick Bank	2.16		2.54	
Percentage point change in annual adult survival rate	0.12%		0.14	

**Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1101. As change in adult survival rate from the Project alone impacts exceeded the 0.02% threshold, a PVA was required for Project alone impacts.

1102. Change in adult survival rate due to in-combination impacts exceeded 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was also required to assess in-combination impacts.

1103. **Table 6-136** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the kittiwake population at Marwick Head SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1104. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-136. Marwick Head SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	0.3	0.0001925776	25	0.9996	0.9997	0.0026	0.9948	1.0048	0.9915	0.9948	0.0682	0.8708	1.1380	50.0	50.0
Project alone CRM+High	0.5	0.0002557878	25	0.9997	0.9997	0.0025	0.9949	1.0050	0.9925	0.9953	0.0665	0.8683	1.1255	48.8	50.9
Incomb CRM+Low ex. BB	1.9	0.0010405421	25	0.9986	0.9987	0.0025	0.9942	1.0037	0.9693	0.9710	0.0647	0.8513	1.1034	46.5	52.8
Incomb CRM+High ex. BB	2.1	0.0011778137	25	0.9986	0.9986	0.0025	0.9939	1.0032	0.9651	0.9669	0.0637	0.8514	1.0897	46.8	52.8
Incomb CRM+Low inc. BB	2.2	0.0011916012	25	0.9985	0.9985	0.0025	0.9936	1.0036	0.9636	0.9650	0.0652	0.8388	1.0901	46.1	53.0
Incomb CRM+High inc. BB	2.5	0.0014030470	25	0.9983	0.9982	0.0025	0.9933	1.0033	0.9598	0.9578	0.0640	0.8391	1.0857	45.4	54.5
Project alone CRM+Low	0.3	0.0001925776	35	0.9997	0.9997	0.0021	0.9954	1.0041	0.9910	0.9922	0.0771	0.8462	1.1576	48.9	51.3
Project alone CRM+High	0.5	0.0002557878	35	0.9997	0.9997	0.0020	0.9958	1.0039	0.9893	0.9935	0.0748	0.8583	1.1539	49.2	50.8
Incomb CRM+Low ex. BB	1.9	0.0010405421	35	0.9988	0.9988	0.0021	0.9948	1.0027	0.9592	0.9601	0.0736	0.8225	1.1077	47.3	52.9
Incomb CRM+High ex. BB	2.1	0.0011778137	35	0.9987	0.9986	0.0021	0.9944	1.0029	0.9516	0.9539	0.0740	0.8188	1.1132	46.5	53.3
Incomb CRM+Low inc. BB	2.2	0.0011916012	35	0.9985	0.9985	0.0021	0.9943	1.0030	0.9508	0.9516	0.0748	0.8190	1.1136	46.2	54.3
Incomb CRM+High inc. BB	2.5	0.0014030470	35	0.9984	0.9983	0.0021	0.9938	1.0021	0.9413	0.9428	0.0735	0.7927	1.0868	45.7	54.1
Project alone CRM+Low	0.3	0.0001925776	50	0.9997	0.9997	0.0018	0.9961	1.0033	0.9852	0.9893	0.0928	0.8240	1.1752	48.8	51.6
Project alone CRM+High	0.5	0.0002557878	50	0.9997	0.9997	0.0018	0.9963	1.0033	0.9857	0.9912	0.0907	0.8271	1.1846	50.0	50.1
Incomb CRM+Low ex. BB	1.9	0.0010405421	50	0.9990	0.9991	0.0018	0.9957	1.0025	0.9522	0.9586	0.0878	0.7983	1.1394	45.8	53.1
Incomb CRM+High ex. BB	2.1	0.0011778137	50	0.9990	0.9989	0.0018	0.9955	1.0022	0.9477	0.9504	0.0875	0.7950	1.1258	46.1	53.3
Incomb CRM+Low inc. BB	2.2	0.0011916012	50	0.9989	0.9989	0.0018	0.9955	1.0024	0.9475	0.9514	0.0896	0.7917	1.1440	46.4	53.2
Incomb CRM+High inc. BB	2.5	0.0014030470	50	0.9987	0.9987	0.0018	0.9950	1.0022	0.9349	0.9396	0.0871	0.7737	1.1267	45.2	54.0

1105. The C-PGR for Project alone impacts after 35 years for the highest impact scenario of high displacement and WCS collision was 0.9997 (95% c.i. 0.9958-1.0039) (**Table 6-136**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.03%. This very small change indicates that the PVA trajectories with Project-alone impacts are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the kittiwake population will be of a similar size after 35 years, in the presence of Project impacts, as would be expected in the absence of Project impacts.

1106. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9983 (95% c.i. 0.9938-1.0021) (**Table 6-136**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.17%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the kittiwake population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts.

1107. The kittiwake population at this SPA is well below the citation population size of 7,700 pairs and feature condition was Unfavourable Recovering, when last assessed in June 2023. Population size at this colony decreased by 84% between the two seabird censuses, Seabird 2000 and Seabirds Count, to 906 AONs (Burnell *et al.*, 2023). Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). However, counts at the Marwick Head SPA in 2023 found a 59% increase in kittiwake AONs at this site, suggesting HPAI has not impacted this population.

1108. The very small Project alone and in-combination impacts on this population will not prevent or reduce the potential for this feature to recover and to be restored in the long term.

1109. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the Marwick Head SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.18.5.2 Guillemot

1110. Predicted guillemot displacement mortality, by season, and change to annual adult survival rate apportioned to the Marwick Head SPA population is presented in **Table 6-137**. NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts (letter from NatureScot to the Project, dated 3 June 2024). However, Berwick Bank Wind Farm did not have connectivity with any of the SPAs with guillemot features, potentially impacted by the Project and so the in-combination assessment does not include any Berwick Bank impacts.

1111. Note, almost all breeding season Project alone guillemot mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-137. Estimated adult guillemot Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the Marwick Head SPA and change in baseline annual adult survival rate.

See ***Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts*** *for more details on calculation of mortalities and changes to survival rate.*

GUILLEMOT	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.46	1.37
Mortality - Non-breeding season (BDMPS)	0.46	1.37
Annual Project alone mortality* (displacement)	0.46	1.37
Percentage point change in annual adult survival rate	<0.01%	0.01%
Annual in-combination	7.11	20.17
Percentage point change in annual adult survival rate	0.04%	0.13%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1112. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1113. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

1114. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

1115. **Table 6-138** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the guillemot population at Marwick Head SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1116. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse

effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-138. Marwick Head SPA: Guillemot PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	0.5	0.000029	25	1.0000	1.0000	0.0005	0.9990	1.0009	0.9993	0.9996	0.0129	0.9737	1.0250	49.5	50.5
Project alone High	1.4	0.000086	25	1.0000	0.9999	0.0005	0.9990	1.0009	0.9985	0.9985	0.0128	0.9733	1.0239	49.5	51.0
Incomb Low	7.1	0.000443	25	0.9995	0.9995	0.0005	0.9985	1.0005	0.9881	0.9880	0.0128	0.9624	1.0145	47.8	52.6
Incomb High	20.2	0.001256	25	0.9986	0.9986	0.0005	0.9977	0.9996	0.9657	0.9654	0.0125	0.9417	0.9904	42.8	57.6
Project alone Low	0.5	0.000029	35	1.0000	1.0000	0.0004	0.9992	1.0007	0.9989	0.9993	0.0145	0.9711	1.0283	49.5	50.6
Project alone High	1.4	0.000086	35	0.9999	0.9999	0.0004	0.9992	1.0007	0.9978	0.9976	0.0145	0.9697	1.0265	49.2	51.1
Incomb Low	7.1	0.000443	35	0.9995	0.9995	0.0004	0.9987	1.0003	0.9830	0.9830	0.0141	0.9545	1.0101	47.6	53.7
Incomb High	20.2	0.001256	35	0.9986	0.9986	0.0004	0.9979	0.9993	0.9521	0.9519	0.0137	0.9262	0.9789	41.4	59.7
Project alone Low	0.5	0.000029	50	1.0000	1.0000	0.0003	0.9994	1.0006	0.9989	0.9996	0.0160	0.9677	1.0314	49.8	50.2
Project alone High	1.4	0.000086	50	1.0000	1.0000	0.0003	0.9994	1.0006	0.9983	0.9982	0.0161	0.9667	1.0294	49.5	50.4
Incomb Low	7.1	0.000443	50	0.9997	0.9997	0.0003	0.9990	1.0003	0.9824	0.9835	0.0159	0.9524	1.0153	46.7	52.5
Incomb High	20.2	0.001256	50	0.9990	0.9990	0.0003	0.9984	0.9997	0.9525	0.9522	0.0156	0.9225	0.9834	41.1	58.2

1117. Predicted Project alone impacts on the guillemot population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

1118. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, was 0.9986 (95% c.i. 0.9979-0.9993) (**Table 6-138**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.14%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the guillemot population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. . Additionally, the Project contributed a mortality of only 1.37 birds per annum to the in-combination total of 20.2 birds per annum (worst case scenario).

1119. The guillemot feature condition was Unfavourable No Change, when last assessed in June 2023. Population size at this colony decreased by 65% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). Guillemot populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The Marwick Head SPA guillemot population had undergone a further decline, by 20%, when counted in 2023 (Tremlett *et al.*, 2023).

1120. Whilst the guillemot population at the Marwick Head SPA is substantially smaller than citation population size and has recently declined further due to HPAI impacts, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any further declines and will not prevent or reduce the potential for this population to recover, in the long term.

1121. Consequently, a conclusion of no AEoSI was reached for the guillemot feature of the Marwick Head SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.18.6 Conclusions

1122. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Marwick Head SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1123. A conclusion of **no AEoSI** was reached for the **guillemot** feature of the **Marwick Head SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs

1124. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake and guillemot, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Marwick Head SPA**.

1125. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Marwick Head SPA** was reached.

6.3.19 Moray Firth SPA

6.3.19.1 Site Description

1126. The Moray Firth SPA was classified in December 2020 for its non-breeding waterbirds and breeding European shag. The site is located to the east of Inverness and is approximately 79 km south of the Project.

1127. The Moray Firth SPA is a funnel-shaped body of sea on the northeast mainland coast of Scotland. Most of the Firth is shallow water (less than 20 m) over a sandy substrate, apart from a 50m deep channel running east-west through muddy substrate. Tidal flows are relatively weak with a maximum tidal range of 3 m and the Firth is relatively sheltered, at least in comparison to the exposure of the Atlantic west coasts. The Moray Firth is an important spawning ground and nursery area for a number of fish species, which together with abundant bivalve molluscs, are important prey species for marine waterbirds.

6.3.19.2 Conservation benefits

1128. The conservation benefits for the Moray Firth SPA are:

- Protecting the largest GB wintering populations of long-tailed duck (approximately 46%) and velvet scoter (approximately 60%) and the third largest GB wintering population of greater scaup (approximately 18%);
- Protecting the largest Scottish wintering populations of common scoter (approximately 6% of GB wintering population) and common goldeneye (approximately 5% of GB wintering population);
- Protecting important numbers of Annex 1 rare and vulnerable species: great northern diver (approximately 6% of GB wintering population), red-throated diver (approximately 2% of GB wintering population) and Slavonian grebe (approximately 4% of GB wintering population);
- Protecting around 3% of the common eider GB wintering population and around 2% of the red-breasted merganser GB wintering population, both of which regularly winter in this area and some of which may remain and use the area during the breeding season;
- Protecting the largest breeding and non-breeding aggregations of European shag in Scotland, with important numbers of the European shag GB wintering and breeding populations using the SPA;
- Protecting sheltered waters with rich marine habitats that support a diversity of pelagic and demersal fish, crustaceans and bivalve molluscs where the protected features can feed, moult and roost.

6.3.19.3 Conservation Objectives for the SPA

1129. The conservation objectives of the Moray Firth SPA are to:

1. To ensure that the qualifying features of the Moray Firth SPA are in favourable condition and make an appropriate contribution to achieving Favourable Conservation Status.

2. To ensure that the integrity of the Moray Firth SPA is restored in the context of environmental changes by meeting objectives 2a, 2b and 2c for each qualifying feature:
    a. The populations of qualifying features are viable components of the site;
    b. The distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species;
    c. The supporting habitats and processes relevant to qualifying features and their prey resources are maintained or, where appropriate, restored at the Moray Firth SPA.

1130. Of particular relevance to the Project is Conservation Objective 2b, due to the Moray Firth SPA being screened in for further assessment due to vessels associated with the Project during construction having the potential to cause disturbance and displacement to the distribution of qualifying features. This Conservation Objective seeks to ensure that the qualifying features can continue to use and access all areas within the Moray Firth SPA used for feeding, moulting, roosting, loafing, shelter and other maintenance activities.

1131. 'Significant disturbance' should be interpreted to mean disturbance that affects the integrity of the site through alteration of the distribution of the qualifying features such that recovery cannot be expected or effects can be considered long term. It is expected that significant disturbance will lead to more than a transient effect on the distribution of the qualifying features. It may result in the following types of effect:

- Contributes to the long-term decline in the use of the site by the qualifying features;
- Changes to the distribution of the qualifying features on a continuing or sustained basis; and/or
- Changes to the qualifying features behaviour such that it reduces the ability of the species to survive, breed or rear their young.

6.3.19.4 Qualifying Features

1132. The qualifying features of the Moray Firth SPA are listed in **Table 6-139.**

1133. The waterfowl species have not been assessed since designation in 2020, however corroborative evidence suggests there is no reason to suspect deterioration in their condition since designation. Therefore, the Conservation Objectives for the waterfowl qualifying features at the Moray Firth SPA seek to maintain this condition. The breeding European shag qualifying feature is in unfavourable condition due to the species being in unfavourable condition at the functionally-linked East Caithness Cliffs SPA (50% decrease in the population since 1996). Therefore, the Conservation Objectives for the breeding European shag qualifying feature at the Moray Firth SPA seek to restore favourable condition.

Table 6-139. Qualifying interests and condition for the Moray Firth SPA.

Qualifying Interests	**Citation population size**	**Seabirds Count population size**	Feature Condition	Assessment Date	Broader Conservation Status
Great northern diver (non-breeding)	a mean peak annual non-breeding population of 144 individuals (5.8% of the Great Britain population)	n/a	Favourable Maintained	8 March 2020	Amber
Red-throated diver (non-breeding)	a mean peak annual non-breeding population of 324 individuals (1.9% of the Great Britain population) for the years 2001/02-2006/07	n/a	Favourable Maintained	8 March 2020	Green
Slavonian grebe (non-breeding)	a mean peak annual non-breeding population of 43 individuals (3.9% of the Great Britain population) for the years 2001/02-2005/06	n/a	Favourable Maintained	8 March 2020	Red
Greater scaup (non-breeding)	a mean peak annual non-breeding population of 930 individuals (17.9% of the Great Britain population) for the years 2001/02 to 2005/06	n/a	Unfavourable Declining	8 March 2020	Red
Common eider (non-breeding)	a mean peak annual non-breeding population of 1,733 individuals (2.9% of the Great Britain population) for the years of 2001/02 to 2006/07	n/a	Favourable Declining	8 March 2020	Amber
Long-tailed duck (non-breeding)	a mean peak annual nonbreeding population of 5,001 individuals (45.5% of the Great Britain population) for the years of 2001/02 to 2005/6	n/a	Favourable Declining	8 March 2020	Red
Common scoter (non-breeding)	a mean peak annual non-breeding population of 5,479 individuals (5.5% of the Great Britain population) for the years 2001/02 to 2005/06	n/a	Favourable Maintained	8 March 2020	Red

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Velvet scoter (non-breeding)	a mean peak annual non-breeding population of 1,488 individuals (59.5% of the Great Britain population) for the years 2001/02 to 2005/06	n/a	Unfavourable Declining	8 March 2020	Red
Common goldeneye (non-breeding)	a mean peak annual non-breeding population of 907 individuals (4.5% of the Great Britain population) for the years 2001/02 to 2005/06	n/a	Unfavourable Declining	8 March 2020	Red
Red-breasted merganser (non-breeding)	a mean peak annual non-breeding population of 151 individuals (1.8% of the Great Britain population) for the years of 2001/02 to 2005/06	n/a	Favourable Maintained	8 March 2020	Amber
European shag (breeding and non-breeding)	at least 6,462 individuals during the non-breeding season (3.2% of the biogeographic population and 5.9% of the Great Britain population) and 5,494 individuals during the breeding season (2.7% of the biogeographic population & 10.2% of the Great Britain population) for the years 1980-2006)	n/a	Favourable Maintained	18 February 2007	Red

1134. The Moray Firth SPA has been designated to protect the following species of wintering marine birds: Red-throated diver, Slavonian grebe, Greater scaup, Common eider, Long-tailed duck, Common scoter, Velvet scoter, Common goldeneye, Red-breasted merganser and both breeding and non-breeding European shag, as well as their supporting habitats.

6.3.19.5 Potential for the Project to impact the site's Conservation Objectives

1135. The Moray Firth SPA was screened in for further assessment due to potential disturbance/displacement of the site's diver, seaduck and shag qualifying features, by vessels associated with the Project during construction.

1136. Currently, the Project is not able to confirm which ports or harbours will be used for construction activities. Potential ports for marshalling and/or assembly are: Scapa Flow Deep water Quay, Port of Nigg, Port of Cromarty, Ardersier, Aberdeen Harbour (logistics only as unsuitable for marshalling or assembly), Port of Leith or Port of Dundee.

1137. If the Project decides to use the ports of Nigg, Cromarty and/or Ardersier for construction, vessels associated with the Project would pass through the Moray Firth SPA when transiting between the ports and the offshore Project.

1138. During operation, smaller vessels associated with routine maintenance will come from the Operations and Maintenance base which, for the purposes of this assessment, is assumed to be in Scrabster. Vessels transiting between the base and the offshore Project would transit through the North Caithness Cliffs SPA marine extension (see North Caithness Cliffs SPA account for assessment of this impact pathway). However, the ports of Nigg, Cromarty or Ardersier may be used very occasionally by vessels required for specific maintenance tasks. These vessels will be very few in number and will be transiting between the port and Project for only a short period. Therefore, vessels associated with the operation & maintenance phase of the Project will have either no impact or a very small impact on the qualifying features of the Moray Firth SPA and so no AEoSI can be concluded for vessel impacts arising during operation. The potential for vessels associated with the construction and decommissioning phase of the Project to impact the site's conservation objectives are considered further.

1139. The Port of Nigg is the largest port in the Moray Firth. It has a deepwater quayside, dry dock and facilities for OWF construction, including storage, laydown and yard logistics support. The Port of Cromarty Firth has been used as an intermediary port for construction of the following OWFs: Beatrice, Moray East, Moray West and Kincardine[43]. The port of Ardersier is under redevelopment and is due to open in 2025. It is being redeveloped with the specific aim of supporting offshore wind development, including marshalling, integration, manufacturing and assembly of offshore wind components[44]. It will be the largest dedicated offshore wind deployment port facility in Scotland.

6.3.19.5.1 Estimated vessels numbers and the relative increase in vessels numbers using ports

1140. Most vessels associated with construction of the Project will spend most of the time in the Offshore Project Area (i.e. in the OAA in which the turbines and other infrastructure will be constructed, or the ECC). During construction, certain vessels will remain offshore for the entire season without entering any port and will therefore require regular servicing by offshore supply vessels. Other vessels will make regular port calls.

1141. The most recent 2019 data for AIS vessels passing through the ports of Nigg, Cromarty and Ardersier was compared with the maximum number of vessel transits estimated at these ports associated with each construction year of the Project (**Table 6-140**). Only the ports of Nigg and Ardersier have the capacity to be used for storage, marshalling and construction of foundations as well as WTGs, therefore the maximum number of vessel transits for the

[43] Renewables - Port of Cromarty Firth (pocf.co.uk)

[44] Ardersier Port - Haventus

construction phase of the Project to/from these ports is 718 one-way transits per annum. All other potential ports to be used by the Project, including Cromarty, only have the capacity to be used for WTG installation, therefore the number of vessel transits estimated at the port of Cromarty is a maximum of 382.

1142. For the port of Nigg, it is important to note that the number of AIS vessel transits recorded in 2019 was due to other offshore wind farm construction activity. As construction of the Project will not overlap with other offshore wind farm construction projects, the estimated 718 transits to/from the port of Nigg will replace construction vessel traffic from other offshore wind farm developments rather than add to the total of 895 transits recorded in 2019.

1143. For the ports of Ardersier and Cromarty, vessel traffic could increase compared with volume of traffic recorded in 2019. However, as the port of Ardersier is currently under construction, the number of vessel transits recorded in 2019 was likely due to construction of the port rather than other vessel usage. Therefore, the 148 transits recorded in 2019 does not represent an operational baseline figure. If the Project decides to use Cromarty, or Ardersier, there could be a be an increase in vessel transits across the six years of construction of the Project, compared with recent years. However, the Port of Nigg and the Cromarty Firth have been used by other OWFs for construction (Moray projects, Seagreen). Consequently, the number of vessels associated with the West of Orkney Windfarm will not be in addition to current vessel traffic but is likely to replace current vessel traffic, as OWFs are constructed sequentially rather than concurrently.

Table 6-140. Estimated numbers of vessels arriving or departing from the ports of Nigg, Cromarty and Ardersier in 2019. The estimated maximum number of transits per year for Project vessels represent a worst case scenario.

Port	Vessel tracks (single journeys) crossing into harbour area	
	2019 AIS vessel track total count	Estimated maximum transits per year for construction of the Project
Nigg	895	718
Cromarty	63	382
Ardersier	148	718

6.3.19.5.2 Indicative vessel transit routes

1144. **Figure 6-20** shows vessel density within the Moray Firth SPA and outside of the site. Vessel traffic using the Moray Firth SPA is generally concentrated to within shipping lanes, particularly through the narrow stretches of the Inner Moray Firth and in the Cromarty Firth. **Figure 6-20** also indicates the potential route that could be taken by Project vessels transiting to/from the ports of Nigg, Cromarty and Ardersier through the Moray Firth SPA heading towards/from the Project. The indicative route follows shipping lanes with highest density of vessel traffic.

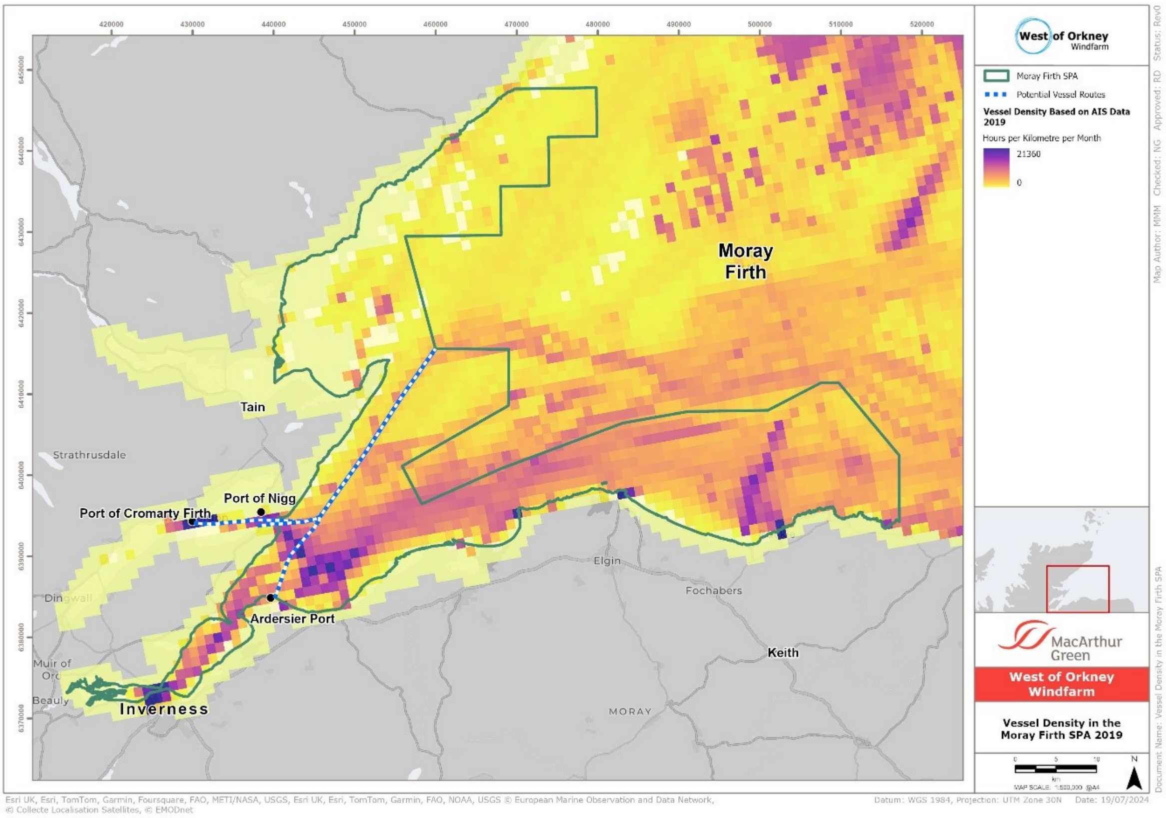


Figure 6-20. Vessel density in the Moray Firth SPA in 2019. Potential indicative routes that may be used by Project vessels to/from the ports of Nigg, Cromarty Firth and Ardersier through the Moray Firth SPA are indicated with a blue/white line

6.3.19.5.3 An estimate of the percentage of the SPA populations that are likely to be impacted and the extent of the SPA impacted

1145. Vessel routes are not known at this stage. However, NatureScot requested (consultation meeting, 2 July 2024) that an estimate of the percentage of the SPA populations that are likely to be impacted and the extent of the SPA impacted is provided in this assessment.

1146. Vessels associated with the Project, that use the ports of Cromarty or Nigg, will be using established shipping lanes. These ports have been used for storage and marshalling for several OWF projects that have been constructed including Beatrice, Moray East, Moray West, Kincardine. Consequently, there will be no increase in the spatial extent of any disturbance caused by vessels associated with the Project. Despite this, an estimate of the percentage of the marine SPA that could be impacted by vessels from the ports of Cromarty or Nigg was calculated, as requested by NatureScot.

1147. The port of Ardersier is currently being redeveloped[45] and at present, there is not a regularly used route from the port. Therefore, it was assumed that vessels would leave the ports of Ardersier and join existing vessel routes.

[45] decision_notice_-_combined_redacted.pdf (marine.gov.scot)

1148. Evidence reviewed by Goodship & Furness (2022) suggests that most waterbirds have a flushing distance of <1 km. Consequently, a buffer of 1 km either side of the vessel track was applied to represent the area in which birds could potentially be disturbed and possibly displaced by the presence of a vessel on transit. A second highly precautionary scenario was considered, using the 2 km buffer that is advised by NatureScot for OWFs, i.e. assuming a buffer of 2 km either side of the vessel track.

1149. For vessels leaving the port of Nigg and heading towards the Project **(Figure 6-20)**, the initial 30.5 km of the vessel route would be within the Moray Firth SPA. Assuming a 1 km buffer either side of the vessel track (i.e. a total disturbance area of 2 km wide by 30.5 km long) gives an area of 61 km^2. Assuming a 2 km buffer either side of the vessel track (i.e. a total disturbance area of 4 km wide by 30.5 km long) gives an area of 122 km^2. The Moray Firth SPA has an area of 1761.738 km^2. This means that under the two scenarios, disturbance of birds could happen over an area of 3.5 % or 6.9 % of the SPA.

1150. For vessels leaving the port of Cromarty Firth and heading towards the Project (**Figure 6-20**), the initial 30.4 km of the vessel route would be within the Moray Firth SPA. Assuming a 1 km buffer either side of the vessel track (i.e. a total disturbance area of 2 km wide by 30.4 km long) gives an area of 60.8 km^2. Assuming a 2 km buffer either side of the vessel track (i.e. a total disturbance area of 4 km wide by 30.4 km long) gives an area of 121.6 km^2. The Moray Firth SPA has an area of 1761.7 km^2. This means that under the two scenarios, disturbance of birds could happen over an area of 3.5 % or 6.9 % of the SPA, under the assumption of disturbance up to 1 km or 2 km from the vessel track, respectively.

1151. For vessels leaving the port of Ardersier and heading towards the Project (**Figure 6-20**), the initial 36.8 km of the vessel route would be within the Moray Firth SPA. Assuming a 1 km buffer either side of the vessel track (i.e. a total disturbance area of 2 km wide by 36.8 km long) gives an area of 73.6 km^2. Assuming a 2 km buffer either side of the vessel track (i.e. a total disturbance area of 4 km wide by 36.8 km long) gives an area of 147.2 km^2. The Moray Firth SPA has an area of 1761.7 km^2. This means that under the two scenarios, disturbance of birds could happen over an area of 4.2 % or 8.4 % of the SPA, under the assumption of disturbance up to 1 km or 2 km from the vessel track, respectively.

1152. This information does not however take into account the distribution of birds within the SPA. This is discussed in detail below and the potential for vessel disturbance to impact the site's conservation objectives is considered.

1153. The information also does not take into account the short-term nature of any disturbance caused by a vessel on transit between the Project and the port. Vessels passing through will only be present in an area for a short period of time, after which any disturbed birds can return to their behaviours they were undertaking prior to the disturbance. There may be a delay before birds return to the same area or behaviour, depending on the species' sensitivity to disturbance and also individual variation in response to presence of a vessel. Therefore the whole transit route will not be subject to disturbance at the same time and so the proportion of the SPA potentially affected by vessels at any one point in time will be much smaller than the estimate provided above.

6.3.19.5.4 In-combination impacts with any other proposed developments within the Project timeframe

1154. Other OWFs which are currently in the planning process, including ScotWind and InTOG projects may use the ports of Nigg, Cromarty and/or Ardersier for construction. In-combination with the Project, this could increase the volume of vessel traffic transiting through the SPA. However, OWF projects are constructed sequentially for many reasons, e.g. limited port capacity, limited vessel availability, etc. Therefore, multiple other OWF projects will not be under construction at the same time as the West of Orkney Windfarm and the extent to which vessel traffic might increase will be constrained.

6.3.19.6 *Spatial and temporal distribution of qualifying features within the site*

1155. In a consultation meeting (24 June 2024), NatureScot advised that "it would be helpful to include information on bird distributions within Scapa Flow, identifying areas of high densities of species susceptible to disturbance by vessels (i.e. divers and seaduck)". As the Moray Firth SPA has been screened in for the same impact pathways as the Scapa Flow SPA, information on the distribution of qualifying features of the Moray Firth SPA is presented within each species' assessment section below.

1156. For all wintering features, a map of their distribution was illustrated using data downloaded from the Marine Directorate's NMPi mapping tool. Data illustrated on the maps for all species except Slavonian grebe and European shag was recorded between 2001 to 2007. Non-breeding Slavonian grebe count data was recorded between 2006 to 2011. For European shags, breeding and non-breeding hotspot polygons were downloaded from the Marine Directorate's NMPi mapping tool, the polygons were created from an analysis of bird sighting observations made between 1980 and 2006.

6.3.19.7 *Assessment of predicted impacts alone and in-combination*

6.3.19.7.1 Great northern diver

1157. Great northern divers have a high vulnerability to disturbance by boats (Furness *et al.* 2013) and may swim away from the path of ferries up to 4 km away (Jarrett *et al*., 2018). Goodship & Furness (2022) classed great northern divers as having a medium to high sensitivity to human disturbance. Goodship & Furness (2022) recommend a buffer zone of up to 350 m for non-breeding great northern divers.

1158. The great northern diver non-breeding population size at SPA citation was 144 individuals, representing 5.8% of the GB population. Great northern divers are present in the Moray Firth SPA from October to mid-May with a flightless moult period from February until mid-April. During this flightless period, they may be more vulnerable to disturbance as they will be unable to fly away to other areas.

1159. Great northern divers were recorded throughout most of the Moray Firth SPA, including to the east of the Black Isle (**Figure 6-21**), where vessels from Ardersier could transit. There are also higher densities of great northern divers along the Easter Ross coast that vessels leaving the Cromarty Firth would potentially transit through. However, routes that these vessels use are existing shipping lanes (**Figure 6-20**) and great northern diver density in these shipping lanes would be expected to be very low (Schwemmer *et al.* 2011). The high density concentrations in Spey Bay and Dornoch Firth are in areas where vessels associated with the

Project will not transit. There is therefore potential for some aggregations of this species to be disturbed/displaced by vessels associated with the Project, but this is restricted to vessels using the port of Ardersier and the sea area to the east of the Black Isle.

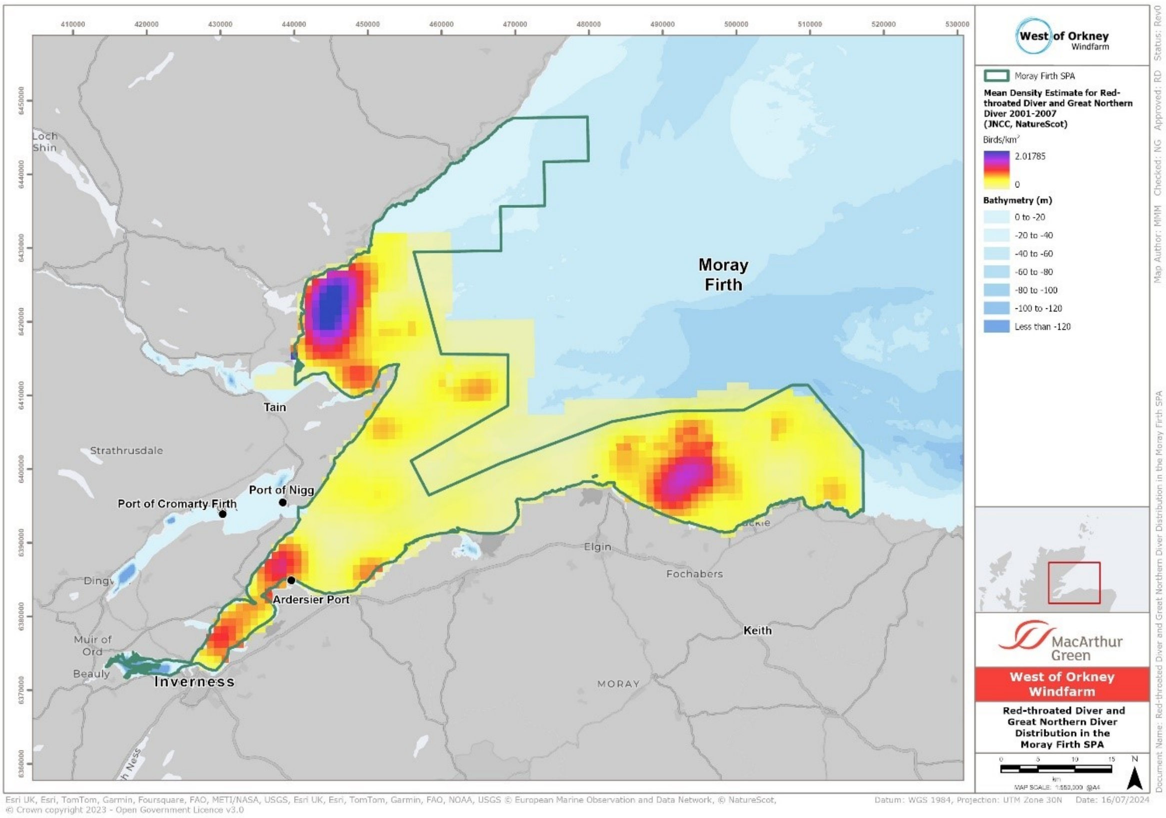


Figure 6-21. Great northern diver and red-throated diver distribution in the Moray Firth SPA from surveys recorded during the non-breeding seasons from 2001 to 2007.

1160. Any displacement effect that does occur will be short-term, both as a vessel passes through an area, after which birds would return to the area, and for the duration of the Project construction period, after which the feature would be expected to return to baseline conditions. The Moray Firth SPA Conservation and Management Advice notes that:

- 'Significant disturbance' should be interpreted to mean disturbance that affects the integrity of the site through alteration of the distribution of the qualifying features such that recovery cannot be expected or effects can be considered long term.

1161. Any displacement effects that do occur would not cause significant disturbance, as defined above. Therefore, a conclusion is reached of no adverse effect on site integrity for this feature.

6.3.19.7.2 Red-throated diver

1162. Red-throated diver have a very high sensitivity to boat disturbance (Furness *et al*. 2013). Red-throated divers avoid shipping lanes and will fly away from approaching vessels at a distance of >1km (S. O'Brien, *pers. obs.*, Schwemmer *et al*. 2011). Burger *et al*. (2019) found red-throated divers in the German Bight to be more abundant in areas of no or little ship traffic and found a strong negative effect of ship speed on the rate at which divers returned to areas after being flushed by a vessel. Burger *et al.* (2019) recommended restricting vessels to shipping lanes and applying speed limits to vessels to reduce the extent of disturbance. Mendel *et al.* (2019) also reported red-throated divers changing their distribution due to ship traffic and OWFs. Goodship & Furness (2022) recommended a breeding season buffer zone of up to 750 m and a non-breeding season buffer zone of up to 1 km for this species.

1163. The Moray Firth SPA red-throated diver non-breeding population size at SPA citation was 324 individuals, representing 1.9% of the GB population.

1164. Red-throated divers occur in higher densities in the Dornoch Firth and Spey Bay (**Figure 6-21**) which are areas that vessels associated with the Project will not use. However, red-throated divers do occur along the Black Isle coast, an area through which vessels using the port of Ardersier would transit. There are also higher densities of red-throated divers along the Easter Ross coast that vessels leaving the Cromarty Firth would potentially transit through. However, routes that these vessels use are existing shipping lanes and red-throated diver density in these shipping lanes would be expected to be very low (Schwemmer *et al.* 2011). Generally, red-throated divers tend to occur closer inshore than the larger great northern diver and vessels associated with the Project (**Figure 6-20**) are unlikely to be using these areas.

1165. Any displacement effect that does occur will be short-term, both as a vessel passes through an area, after which birds would return to the area, and for the duration of the Project construction period, after which the feature would be expected to return to baseline conditions. The Moray Firth SPA Conservation and Management Advice notes that:

- 'Significant disturbance' should be interpreted to mean disturbance that affects the integrity of the site through alteration of the distribution of the qualifying features such that recovery cannot be expected or effects can be considered long term.

1166. Any displacement effects that do occur would not cause significant disturbance, as defined above. Therefore, a conclusion is reached of no adverse effect on site integrity for this feature.

6.3.19.7.3 Slavonian grebe

1167. Slavonian grebe have a high sensitivity to boat disturbance (Goodship & Furness, 2022). Slavonian grebes can be absent from areas where regular marine activity takes place. However, Slavonian grebes appear to habituate to regular presence of vessels, occurring in areas with frequent ferry and fishing vessel traffic in Orkney (Jackson, 2018).

1168. The Moray Firth SPA Slavonian grebe non-breeding population size at SPA citation was 43 individuals, representing 3.9% of the GB population. Slavonian grebes are present in the Moray Firth SPA from mid-September to late April, with a flightless moult period prior to arriving in the Moray Firth. Individuals occurred throughout the coastal areas of the Moray Firth SPA, using sheltered inshore areas (**Figure 6-22**). This species does not occur further offshore in the site.

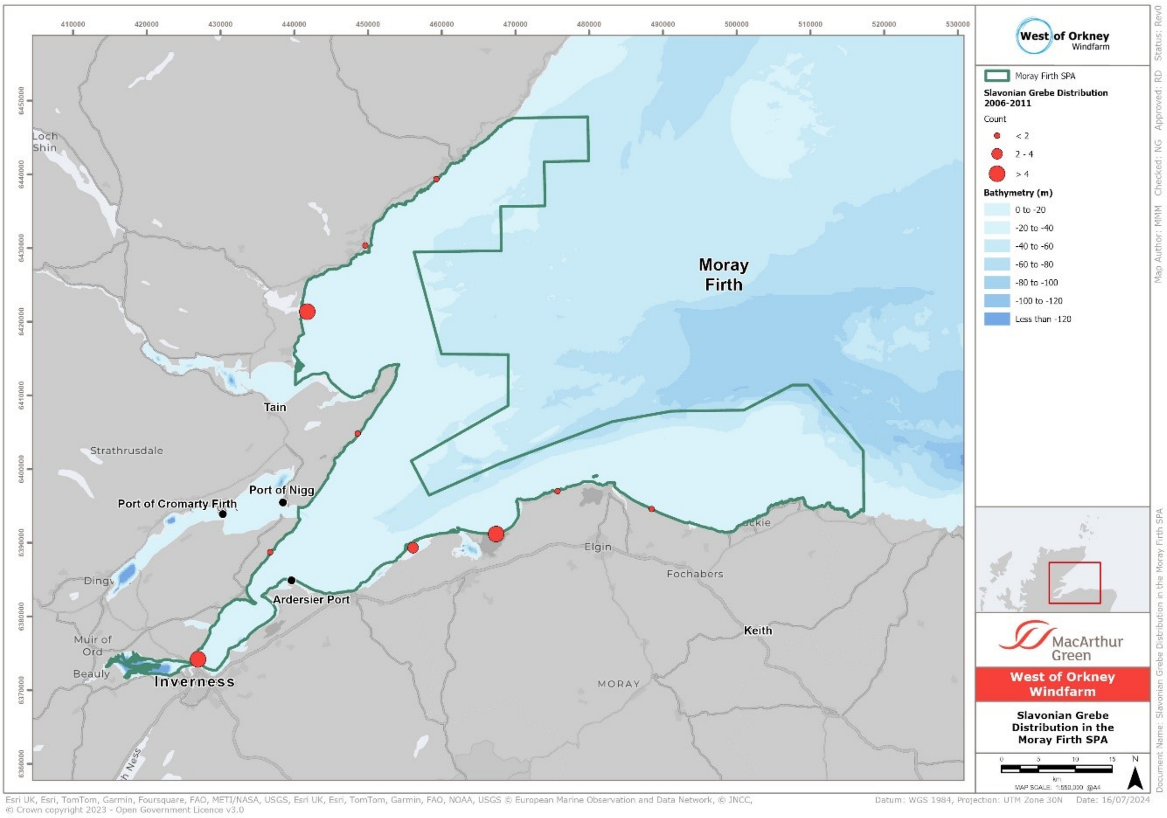


Figure 6-22. Slavonian grebe distribution in the Moray Firth SPA from surveys recorded during the non-breeding seasons between 2006 to 2011.
Data downloaded from the Marine Directorate's NMPi mapping tool.

1169. As this species occurs only close inshore in shallow waters, there is no overlap with potential vessel transit routes from the ports of Cromarty Firth, Nigg or Ardersier (**Figure 6-20**). Vessels associated with the Project would be highly unlikely to cause disturbance/displacement to this species. Consequently, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.19.7.4 Greater scaup

1170. Greater scaup are reported to have a high vulnerability to disturbance by boats (Furness et al. 2013; Mendel et al. 2008) and Goodship & Furness (2022) described greater scaup as having a high sensitivity to disturbance.

1171. Greater scaup are present in the Moray Firth SPA between mid-September and March. The Moray Firth SPA greater scaup non-breeding population size at SPA citation was 930 individuals, representing 17.9% of the GB population. Greater scaup concentrations were highest near Inverness and Burghead Bay/Culbin Sands with no scaup seen in the east and northern parts of the SPA (**Figure 6-23**). They have an inshore distribution, favouring shallow waters. In January/February scaup have been recorded rafting with other seaduck in the Dornoch Firth.

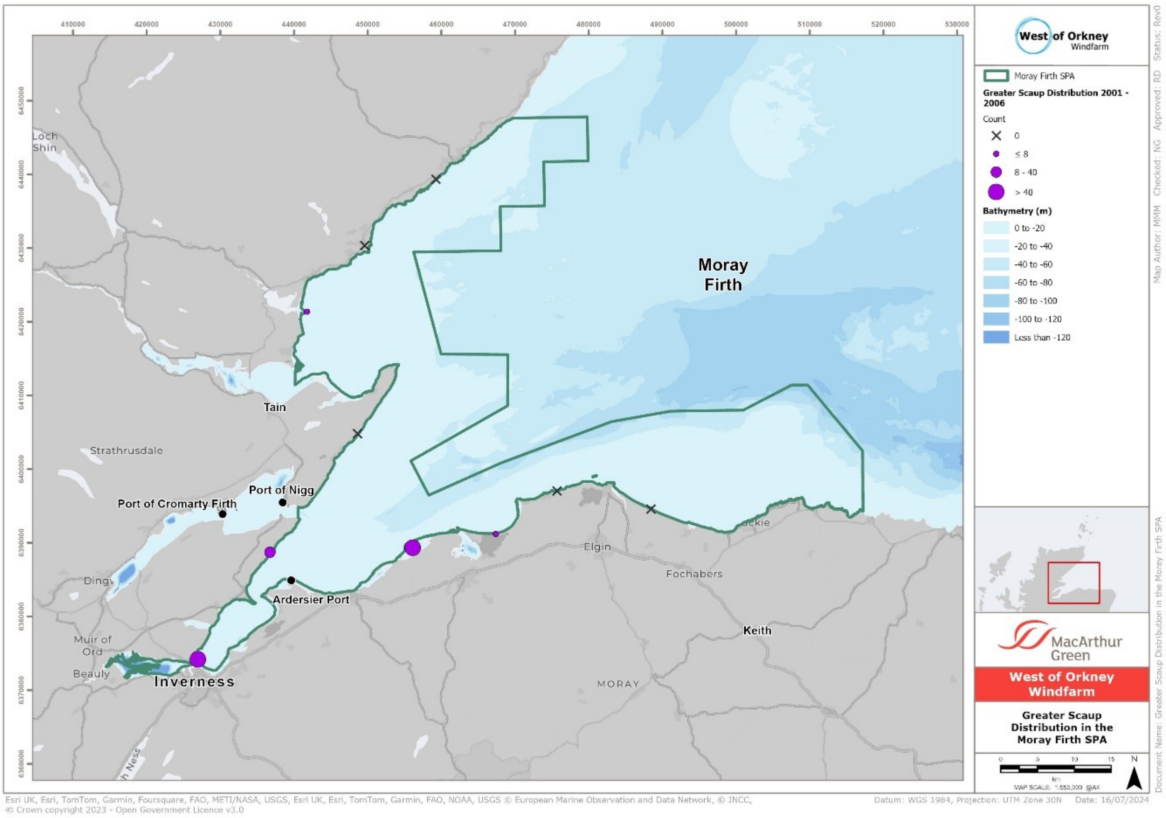


Figure 6-23. Greater scaup distribution in the Moray Firth SPA from surveys recorded during the non-breeding seasons between 2001 to 2006.

1172. Greater scaup use shallow coastal waters, generally less than 10m deep. Whilst they were recorded in low numbers along the Black Isle and Easter Ross coast (**Figure 6-23**), these birds will be close inshore and will not overlap with the routes used by vessels from the ports of Ardersier, Nigg or Cromarty Firth (**Figure 6-20**).

1173. Whilst greater scaup show high sensitivity to vessel disturbance, the lack of overlap in scaup distribution and transit routes used by vessels associated with the Project mean it is highly unlikely that vessels would cause disturbance to greater scaup. Consequently, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.19.7.5 Common eider

1174. Common eiders have a medium to high sensitivity to human disturbance (Goodship & Furness, 2022). Eiders can be disturbed by boats that are moving quickly through foraging, roosting and moulting areas (Goodship & Furness, 2022). Eider foraging activity has been demonstrated to be reduced by boat disturbance (Merkel *et al.* 2009). Goodship & Furness (2022) recommended a buffer zone of up to 500 m for eiders in the non-breeding season to protect roosting and foraging birds from disturbance from watercraft.

1175. The Moray Firth SPA common eider non-breeding population size at SPA citation was 1,733 individuals, representing 2.9% of the GB population. Eiders are present throughout the year in the Moray Firth SPA. In the non-breeding season (September to mid-April), eider distribution was concentrated along the Moray coast of the SPA with highest densities occurring from Burghead to Lossiemouth (**Figure 6-24**). As benthic feeders, eiders are constrained to water <3 metres deep although they also roost on the sea, in areas of deeper water (Snow & Perrins, 1998). Highest densities were recorded close inshore, in shallow waters, often in rafts with other species of seaduck. Their flightless moult period is July to mid-September, when they prefer sheltered waters, free from disturbance.

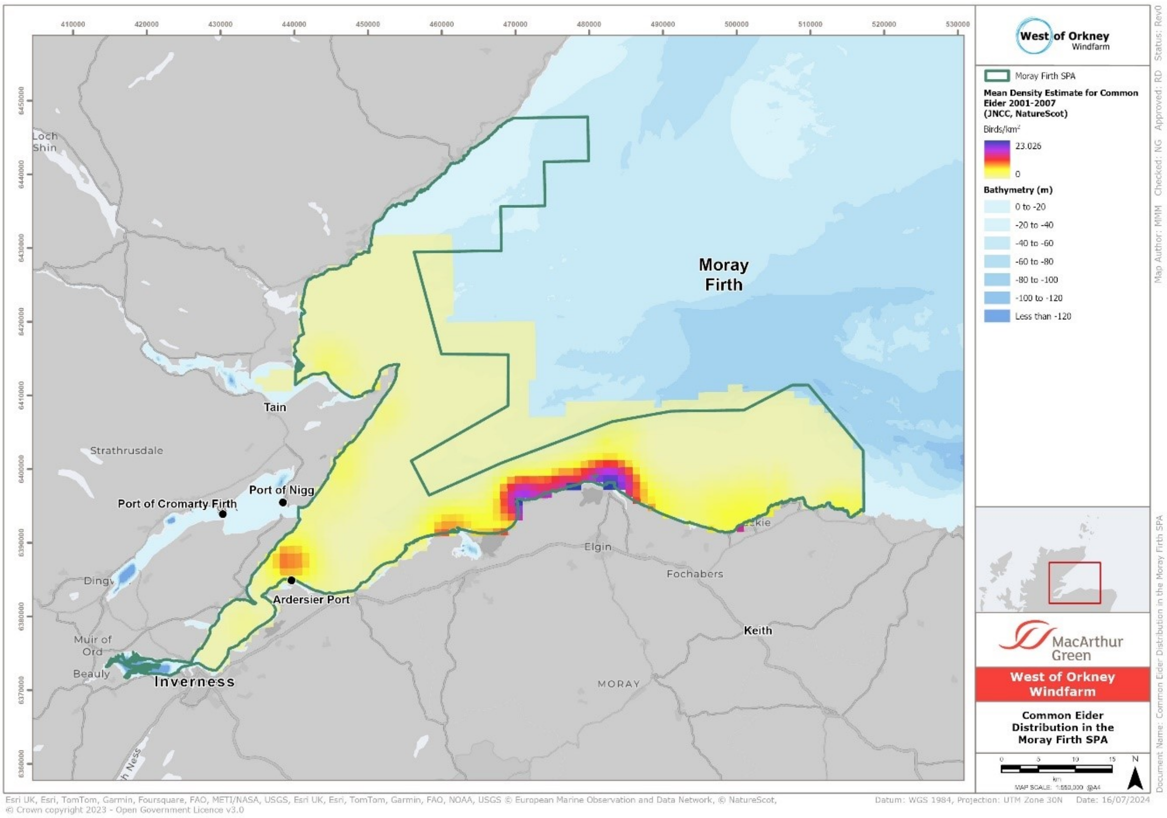


Figure 6-24. Common eider distribution in the Moray Firth SPA recorded from surveys recorded during the non-breeding seasons between 2001 to 2007.

1176. There was an aggregation of eiders identified off the Black Isle coast, an area through which vessels using the port of Ardersier would transit. However, eiders tend to only occur close inshore, in shallow waters and so are unlikely to occur in higher densities in areas used by vessels associated with the Project (**Figure 6-20**). There is therefore low potential for vessels to cause disturbance/displacement of this feature. Consequently, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.19.7.6 Long-tailed duck

1177. Long-tailed duck have a moderate sensitivity to boat disturbance, with Bradbury *et al.* (2014) giving this species a score of 3 for disturbance susceptibility (on a scale of 1 to 5). Jackson (2018), while counting long-tailed ducks from a vessel in Scapa Flow, noted birds flying off while being counted, with them alighting a few hundreds of metres away or flying further, suggesting higher sensitivity to the presence of vessels.

1178. Long-tailed ducks are present in the Moray Firth SPA from mid-September to late April or May. The Moray Firth SPA long-tailed duck non-breeding population size at SPA citation was

5,001 individuals, representing 45.5% of the GB population. Long-tailed ducks were recorded throughout most of the SPA with highest concentrations around Burghead (**Figure 6-25**).

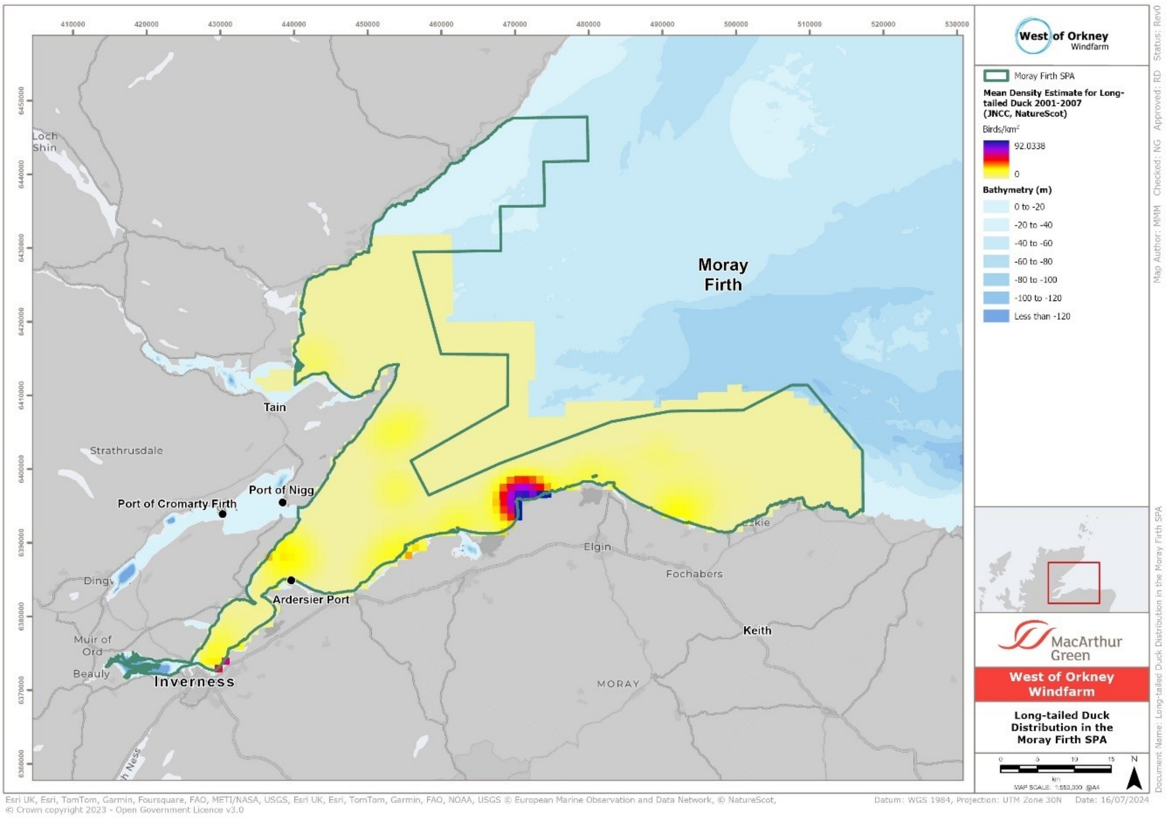


Figure 6-25. Long-tailed duck distribution in the Moray Firth SPA from surveys recorded during the non-breeding seasons between 2001 to 2007.

1179. Lower densities were recorded along the Black Isle coast, an area through which vessels using the port of Ardersier could potentially transit (**Figure 6-20**). Long-tailed ducks can occur further offshore than some other species of grebe and seaduck. Therefore, there is a possibility of low numbers of long-tailed ducks occurring in areas used by vessels from Ardersier. Vessels using Nigg or Cromarty ports would not be expected to transit through any areas of high densities of long-tailed ducks.

1180. The Moray Firth SPA holds almost half of the British wintering population of long-tailed ducks. However, most of these individuals winter in areas that would not be transited by vessels associated with the Project. Whilst there is a possibility of vessels from Ardersier transiting through lower densities of long-tailed ducks off the Black Isle coast, given this species' moderate sensitivity to the presence of vessels, disturbance of this qualifying feature is unlikely. Consequently, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.19.7.7 Common scoter

1181. Common scoter are highly sensitive to the presence of vessels and may flush from boats that are >3 km away (Schwemmer *et al.* 2011). Goodship & Furness (2022) classified common scoter as having a high sensitivity to disturbance.

1182. The Moray Firth SPA common scoter non-breeding population size at SPA citation was 5,479 individuals, representing 5.5% of the GB population. Common scoters were recorded throughout the Moray Firth SPA, close inshore. The largest aggregations were along the Moray Coast at Culbin Sands, Burghead Bay and Spey Bay (**Figure 6-26**). Birds may move offshore to roost at night. Peak numbers occur in the Moray Firth during October to April, although common scoter can be present in any month. The flightless moult period lasts from mid-July to October.

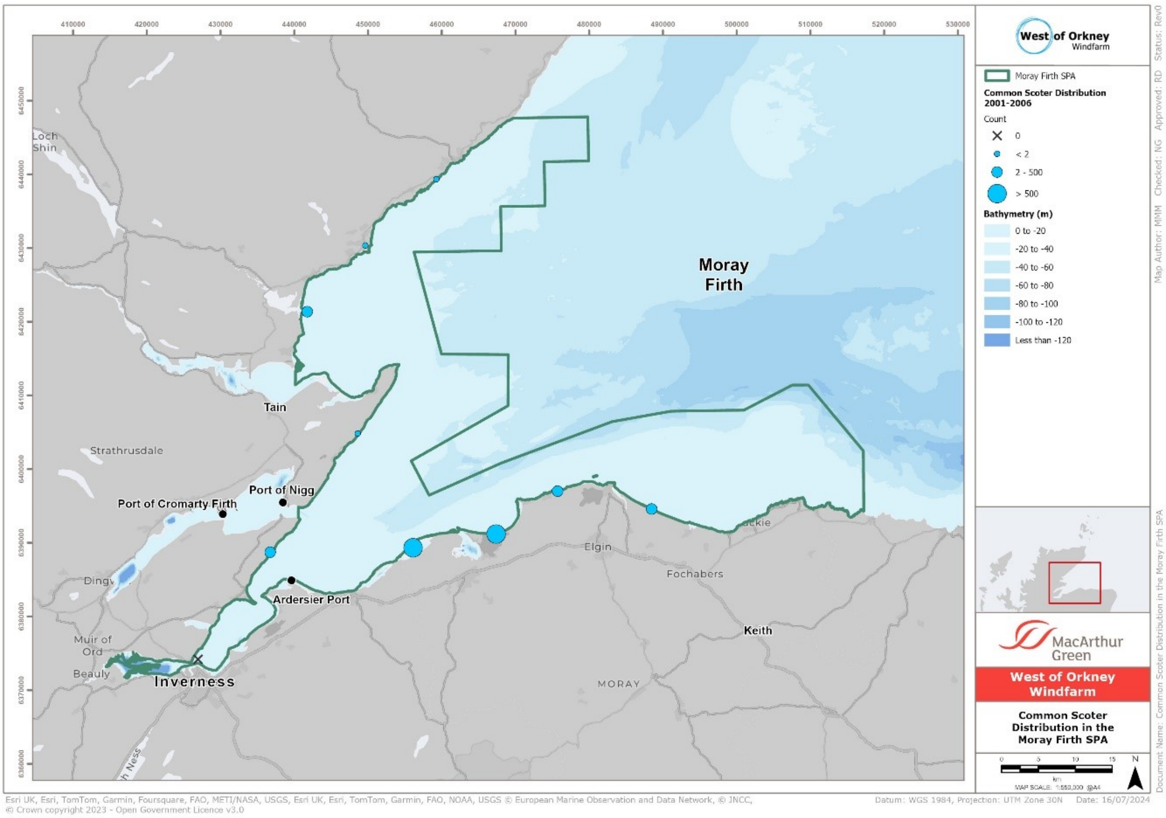


Figure 6-26. Common scoter distribution in the Moray Firth SPA from surveys recorded during the non-breeding seasons between 2001 to 2006.

1183. In the Moray Firth, common scoter has an inshore distribution which is concentrated along the Moray coast. Low numbers were recorded along the Black Isle and Easter Ross coasts, and therefore, despite the high sensitivity of this species to the presence of vessels, shipping associated with the Project (**Figure 6-20**) is unlikely to disturb common scoter in the Moray Firth due to the inshore distribution and relatively low density of this feature in areas where vessels might transit. Given this, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.19.7.8 Velvet scoter

1184. The susceptibility of velvet scoter to disturbance was not assessed by Goodship & Furness (2022). However, Bradbury *et al.* (2014) classed velvet scoter as having a high sensitivity to disturbance (score of 5 out of 5), which was the same as common scoter.

1185. The Moray Firth SPA is one of the most important sites for wintering velvet scoter in Britain. The Moray Firth SPA velvet scoter non-breeding population size at SPA citation was 1,488 individuals, representing 59.85% of the GB population. Velvet scoters were recorded mostly along the Moray coast of the Moray Firth SPA, occurring close inshore. They were absent from the Black Isle coastline (**Figure 6-27**). Velvet scoters are present in the Moray Firth SPA between September and mid-April, with a flightless moult period from July to October.

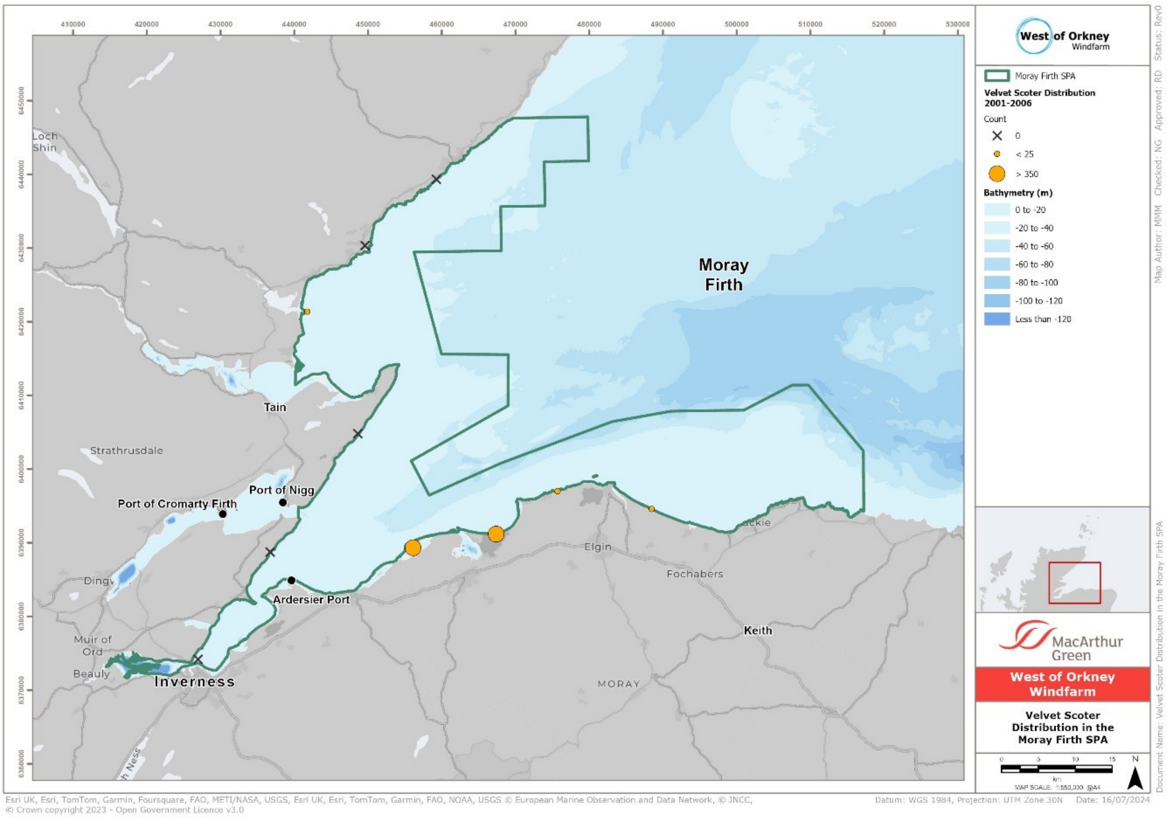


Figure 6-27. Velvet scoter distribution in the Moray Firth SPA from surveys recorded during the non-breeding seasons between 2001 to 2006.

1186. Velvet scoters were concentrated along the Moray coast and in the Dornoch Firth but were absent from the Black Isle and Easter Ross coasts. Therefore, despite the high sensitivity of this species to vessels and the importance of this site for this species, vessels associated with the Project (**Figure 6-20**) will not transit areas used by this species. Consequently, a conclusion of no adverse effect on site integrity for this qualifying feature is reached.

6.3.19.7.9 Common goldeneye

1187. Goodship and Furness (2022) reported goldeneye as having a high sensitivity to disturbance, recommending a buffer zone of up to 800m in the non-breeding season. Jarrett et al. (2018) noted that, in Orkney, goldeneye rarely come into contact with marine activity due to their preference for very sheltered areas.

1188. The Moray Firth SPA common goldeneye non-breeding population size at SPA citation was 907 individuals, representing 4.5% of the GB population. Common Goldeneye occurred throughout the Moray Firth SPA, close inshore, using shallow freshwater, brackish and marine waters (**Figure 6-28**). They are often associated with estuaries. Goldeneyes are present in the Moray Firth SPA during September to mid-April, with a flightless period during July to September.

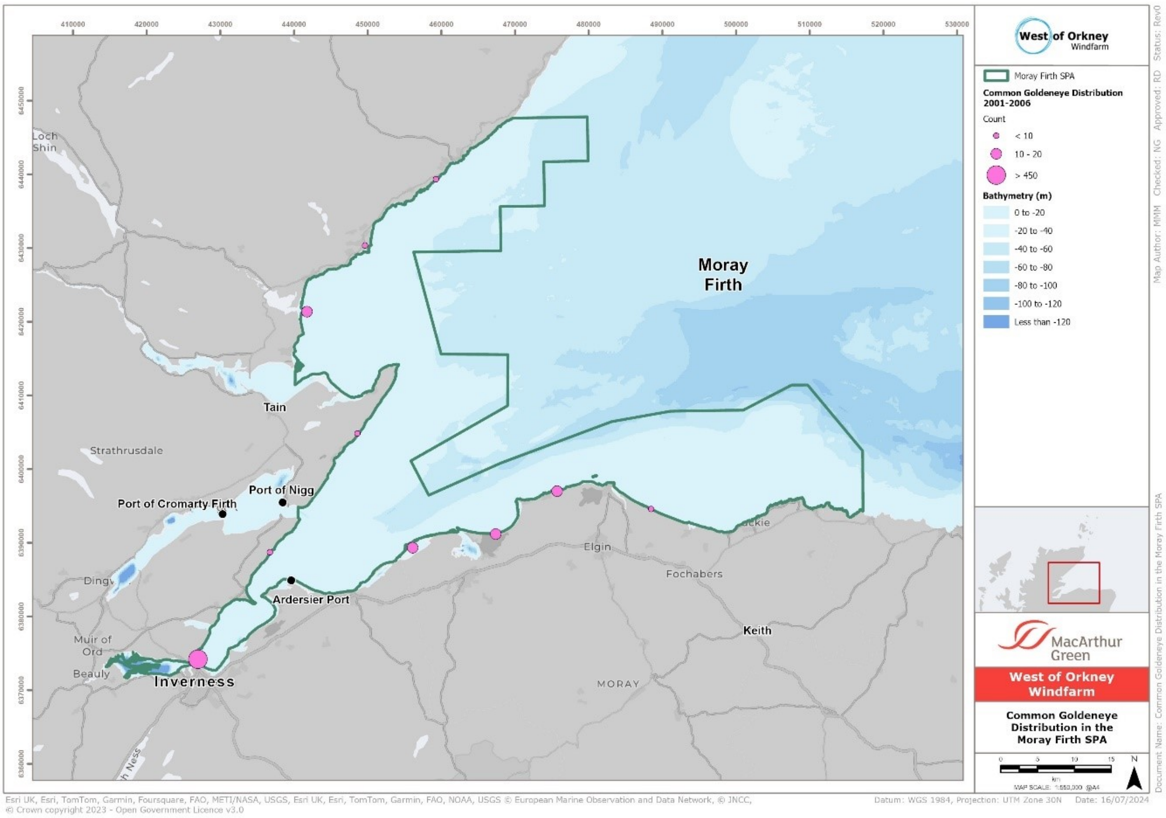


Figure 6-28. Common goldeneye distribution in the Moray Firth SPA from surveys recorded during the non-breeding seasons between 2001 to 2006.

1189. Goldeneye has an inshore distribution and were only recorded in low numbers along the Black Isle and Easter Ross coasts. Vessels using the ports of Ardersier, Nigg or Cromarty (**Figure 6-20**) would be highly unlikely to cause disturbance to goldeneye as vessels will be using deeper water channels further offshore. Given this, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.19.7.10 Red-breasted merganser

1190. Red-breasted merganser have a moderate sensitivity to boat disturbance, with Bradbury *et al.* (2014) giving this species a score of 3 for disturbance susceptibility (on a scale of 1 to 5). However, Mendel *et al.* (2008) and Jarrett *et al.* (2018) noted the sensitivity of red-breasted mergansers to vessel movements.

1191. The Moray Firth SPA red-breasted merganser non-breeding population size at SPA citation was 151 individuals, representing 1.8% of the GB population. Red-breasted mergansers were recorded throughout coastal areas of the Moray Firth SPA (**Figure 6-29**). They are present throughout the year, with a non-breeding period from mid-August to late March, and a flightless moult period of July-September. Jackson (2018), when surveying red-breasted mergansers in Scapa Flow, noted individuals were almost always in shallow water within 2 km of the coast.

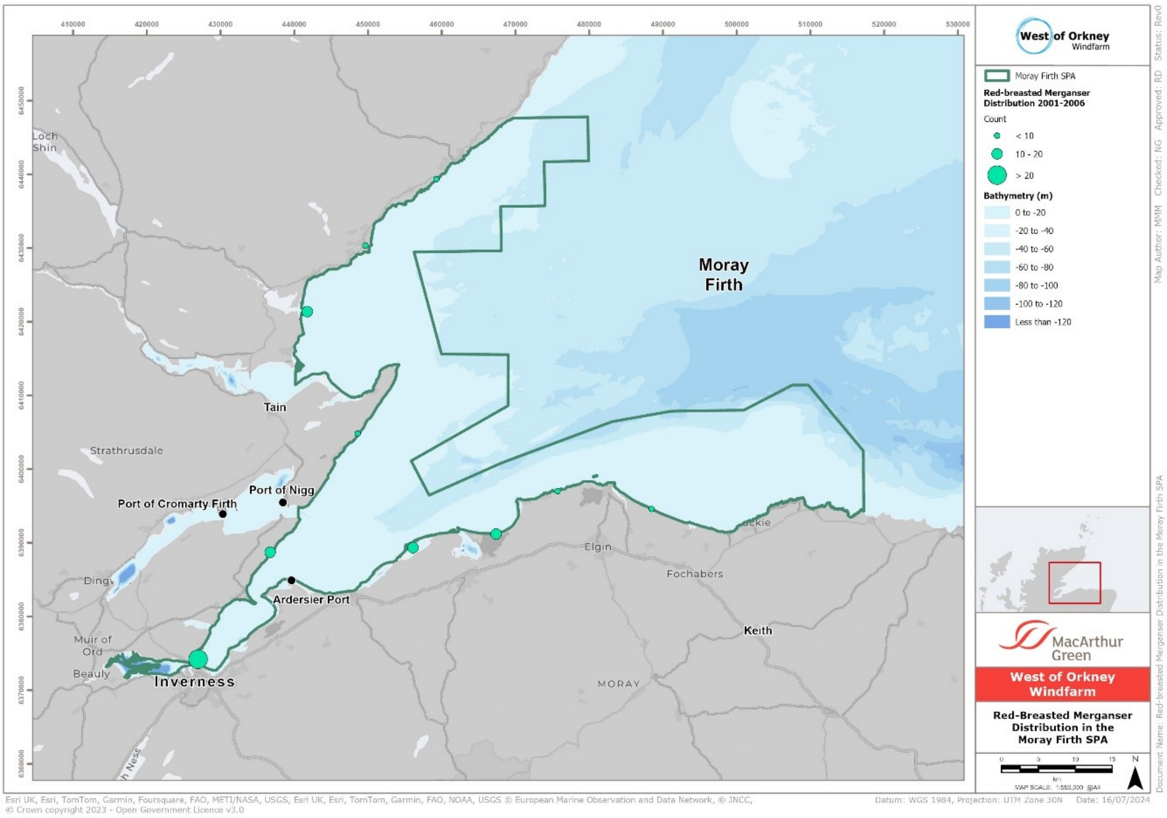


Figure 6-29. Red-breasted merganser distribution in the Moray Firth SPA from surveys recorded during the non-breeding seasons between 2001 to 2006.

1192. Given their moderate sensitivity to boat disturbance and close inshore distribution, where vessels associated with the Project would not transit (**Figure 6-20**), a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.19.7.11 European shag

1193. European shag have a moderate sensitivity to boat disturbance, with Bradbury *et al*. (2014) giving shags a score of 3 for disturbance susceptibility (on a scale of 1 to 5).

1194. The Moray Firth SPA European shag breeding population size at SPA citation was 5,494 individuals (10.2% of the GB population) and the non-breeding population size at citation was 6,462 individuals, representing 3.2% of the GB population. Shag distribution in the Moray Firth SPA was close to their breeding colony of East Caithness Cliffs SPA (Brora to Helmsdale) and near Cullen on the Moray coast (**Figure 6-30**). Their preference is for shallow sandy areas for foraging, as they are benthic feeders. Their non-breeding period is from late September to early February, but they are resident in the Moray Firth SPA throughout the year.

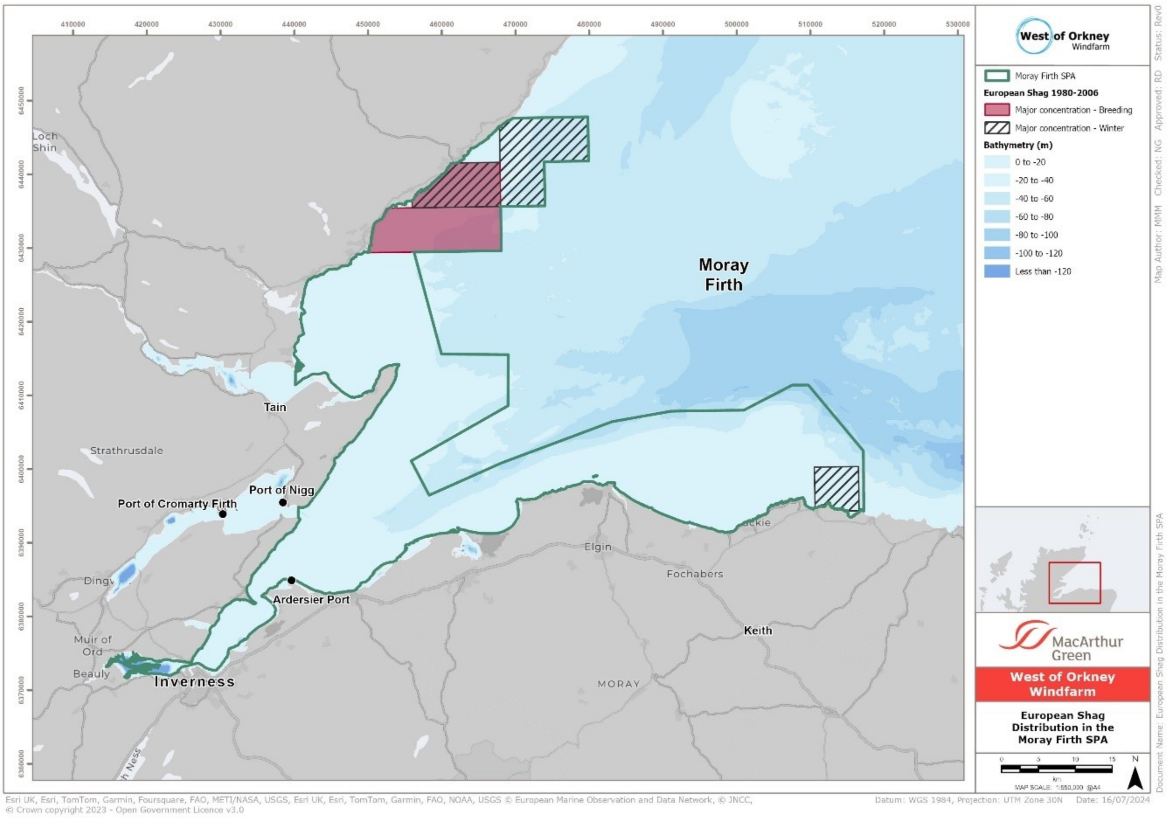


Figure 6-30. European shag breeding and wintering distribution in the Moray Firth SPA.

1195. Shags were not present in high densities in areas through which vessels associated with the Project would transit (**Figure 6-20**). Consequently, a conclusion of no adverse effect on site integrity for this feature is reached, for both the breeding and non-breeding season.

6.3.19.8 Conclusions

1196. A conclusion of **no adverse effect on site integrity** is reached for all qualifying features of the **Moray Firth SPA** from both **Project alone** and **in-combination** potential vessel impacts. However, noting the possible overlap with great northern diver and red-throated diver distributions with vessel transit routes and the high sensitivity of these two species to vessels, further consideration is given to minimising the possibility of disturbance/displacement to those species by vessels associated with the Project.

6.3.19.9 Potential mitigation measures

1197. The site's Conservation and Management Advice[46] advises that for 'boat use associated with both commercial and recreational activities', for diver and seaduck qualifying features and/or named components of the wintering waterbird assemblage feature, the following should be undertaken to support site management:

- Reduce or limit pressures (disturbance) associated with boat use during commercial and recreational activities through effective mitigation such as:

[46] SiteLink - Outer Firth of Forth and St Andrews Bay Complex SPA (nature.scot)

- following the Scottish Marine Wildlife Watching Code (SMWWC);
- seasonal restrictions to avoid sensitive time periods for those protected features most susceptible to disturbance; and/or
- production of vessel management plans associated with activities that require a marine licence. This may include agreed routes and for boats, potential seasonal speed restrictions.

1198. An outline Navigational Safety and Vessel Management Plan was submitted with the West of Orkney Windfarm application[47]. This will be further developed post-consent, once there is certainty over which ports/harbours will be used during construction. Vessels will be required to adhere to the Vessel Management Plan, including adhering to embedded mitigation measures and to follow existing shipping routes where possible.

1199. Despite no AEoSI, the following mitigation measures are proposed to ensure no adverse effect on site integrity:

- Project vessels will limit their speed while transiting through the SPA to 10 kts; and
- Pre construction / mobilisation briefings will be used to highlight bird sensitivity to vessel movements and the mitigations required in order to minimise potential impacts to birds in marine SPAs;
- The vessel crew will watch for aggregations of seabirds on the water and, if aggregations are seen, will alter the vessel's Master. Where necessary and having regard to maritime safety, the vessel's course and/or speed will be adjusted to avoid aggregations of birds.

1200. Limiting a vessel's speed will reduce disturbance as marine birds have been shown to be less likely to be displaced by slower moving vessels. It will also reduce engine noise, which can also disturb birds. Avoiding aggregations of birds on the water will also reduce disturbance, although the most sensitive species, such as great northern diver, may react to the presence of the vessel before they are readily visible to the crew.

[47] omp4 - outline navigation and safety and vessel management plan.pdf (marine.gov.scot).

6.3.20 North Caithness Cliffs SPA

6.3.20.1 *Site Description*

1201. The North Caithness Cliffs SPA was classified on 16 August 1996, with a marine extension classified on 25 September 2009, due to its populations of breeding seabirds. The site is approximately 27 km south of the Project.

1202. North 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.

1203. The site overlaps either partly or wholly with Duncansby Head SSSI, Stroma SSSI, Dunnet Head SSSI, Holborn Head SSSI, and Red Point Coast SSSI. The seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface.

6.3.20.2 *Conservation Objectives for the SPA*

1204. The conservation objectives of the North Caithness Cliffs SPA are:

- 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
- 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.

6.3.20.3 *Qualifying features*

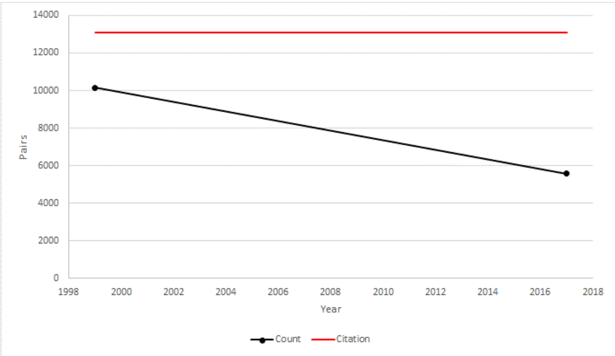
1205. The qualifying features of the SPA are presented below in **Table 6-141**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

Table 6-141. Qualifying interests and condition for the North Caithness Cliffs SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

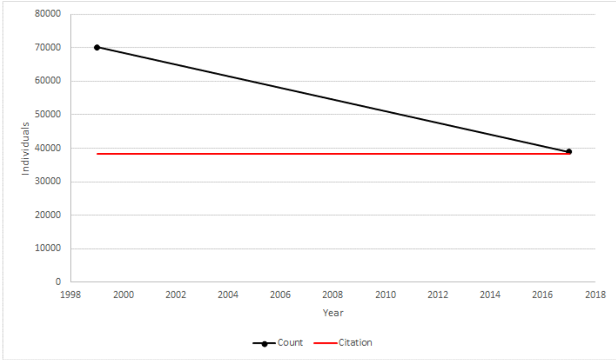
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake* (breeding)	13,100 pairs, 3% of the GB population	5,571 pairs	Unfavourable No change	1 June 2023	Red
Guillemot* (breeding)	1985 to 1987, 38,300 individuals, 1% of the North Atlantic biogeographic population	38,898 individuals	Favourable Maintained	1 June 2023	Amber
Razorbill* (breeding)	4,000 individuals, 3% of the GB population	3,579 individuals	Favourable Maintained	1 June 2023	Amber
Puffin* (breeding)	2,080 pairs, 0.4% of the GB population and greater than 2,000 individuals	3,039 pairs	Unfavourable Declining	1 June 2023	Red
Fulmar* (breeding)	14,700 pairs; 3% of the GB population	15,370 pairs	Favourable Maintained	1 June 2023	Amber
Peregrine (breeding)	an estimated 6 pairs, 0.5% of the GB population and selected as one of the most suitable sites for peregrine in GB	n/a	Unfavourable Declining	24 June 2014	Green
Seabird assemblage (breeding)	regularly supports in the period 1985 to 1987 110,000 seabirds including nationally important populations	n/a	Favourable Maintained	13 June 2016	n/a

1206. North Caithness Cliffs SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 110,000 seabirds including nationally important populations of the following species: black-legged kittiwake, razorbill, Northern fulmar, common guillemot and Atlantic puffin.

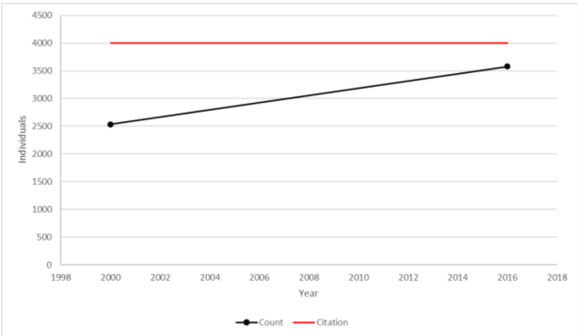
1207. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) count data was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-31**).



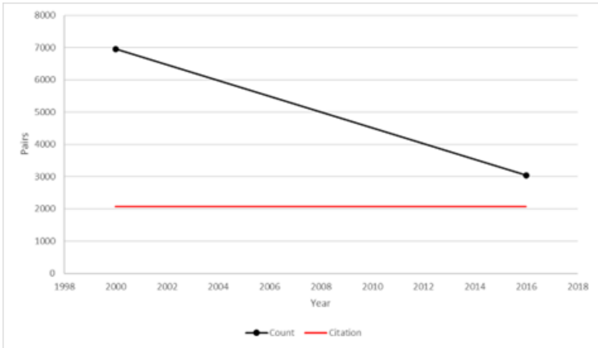
Kittiwake



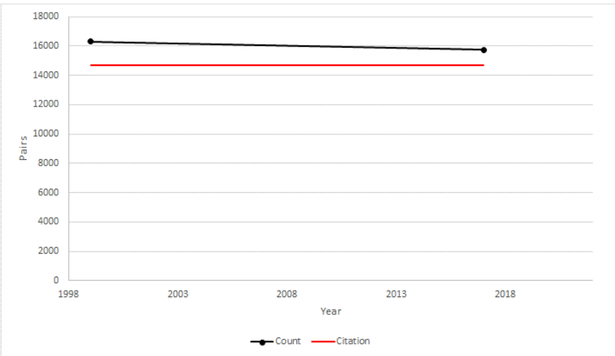
Guillemot



Razorbill



Puffin



Fulmar

Figure 6-31. North Caithness Cliffs SPA qualifying feature population trends from 1981–- 2022 (citation population size shown by red line).

6.3.20.4 Potential for the Project to impact the site's conservation objectives

1208. The North Caithness Coast SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project, including vessels transiting to/from Scrabster Harbour, during operation on the **guillemot** qualifying feature, during the breeding and non-breeding season;

- Displacement impacts from the offshore Project, including vessels transiting to/from Scrabster Harbour, during operation, on the **razorbill** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project, including vessels transiting to/from Scrabster Harbour, during operation, on the **puffin** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project, including vessels transiting to/from Scrabster Harbour, during operation, on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project, including vessels transiting to/from Scrabster Harbour, during operation, on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project, including vessels transiting to/from Scrabster Harbour, during operation, on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

1209. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

1210. These predicted impacts have the potential to undermine the conservation objectives:

- 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; and
  - No significant disturbance of the species.

1211. There is no potential for the Project to undermine the other conservation objectives.

6.3.20.5 Assessment of predicted impacts for Project alone and in-combination

1212. An in-combination assessment was undertaken that collated quantitative information on impacts to features of this SPA from published consent applications. Note that no other OWFs have been required to undertake a quantitative assessment of fulmar displacement/barrier impacts and so an in-combination assessment was not possible for this species. This was discussed and agreed with NatureScot (consultation meeting, 11 June 2024).

1213. Other reasonably foreseeable projects which have not yet submitted an application may also impact some of the qualifying features of this site. MD-LOT advised (by email, 10 June 2024) that a qualitative assessment of OWF projects for which a Scoping Opinion has been adopted should be undertaken.

1214. OWF projects for which a Scoping Opinion has been adopted and which identified possible impacts from their project on the North Caithness Cliffs SPA, in their Scoping Reports, are listed in **Table 6-142**.

Table 6-142 In-combination project with the potential to impact the North Caithness Cliffs SPA that have not yet submitted an application. Only features which could be impacted by Project impacts are listed

SPA qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Atlantic puffin	Y					
Black-legged kittiwake	Y					Y
Common guillemot	Y					Y
Northern fulmar	Y					Y
Razorbill	Y					Y

1215. The predicted impacts from these projects have not been considered in the quantitative assessment of the impacts from the Project in-combination with other reasonably foreseeable projects, as it is assumed that these projects will need to consider this Project in their in-combination assessments.

6.3.20.5.1 Kittiwake

1216. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the North Caithness Cliffs SPA is presented in **Table 6-143**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-143. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities apportioned to the North Caithness Cliffs SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	2.86	0.48	2.86	1.60
Mortality - Non-breeding season (NatureScot)	0.66	0.11	0.66	0.32
Mortality - Autumn migration (BDMPS)	0.24	0.03	0.24	0.10
Mortality - Spring migration (BDMPS)	0.42	0.08	0.42	0.21
Annual Project alone mortality (collision + displacement)*	4.11		5.45	
Percentage point change in annual adult survival rate	0.04%		0.05%	
Annual in-combination mortality excl. Berwick Bank	37.97		43.73	
Percentage point change in annual adult survival rate	0.34%		0.39%	

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Annual in-combination mortality incl. Berwick Bank		44.37		53.04
Percentage point change in annual adult survival rate		0.40%		0.48%

** Sum of collision plus displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1217. As change in adult survival rate from the Project alone impacts exceeded the 0.02% threshold, a PVA was required for Project alone impacts.

1218. Change in adult survival rate due to in-combination impacts also exceeded 0.02%, and as Project alone mortality was more than 0.2 birds per annum, a PVA was also required to assess in-combination impacts.

1219. **Table 6-144** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the kittiwake population at North Caithness Cliffs SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1220. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-144. North Caithness Cliffs SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	4.1	0.0003693140	25	0.9996	0.9996	0.0010	0.9977	1.0015	0.9879	0.9890	0.0261	0.9396	1.0400	47.9	52.0
Project alone CRM+High	5.4	0.0004888103	25	0.9994	0.9994	0.0010	0.9975	1.0014	0.9857	0.9854	0.0263	0.9350	1.0380	47.8	52.6
Incomb CRM+Low ex. BB	38.0	0.0034078988	25	0.9960	0.9960	0.0010	0.9941	0.9979	0.9023	0.9025	0.0232	0.8562	0.9497	38.4	61.9
Incomb CRM+High ex. BB	43.7	0.0039249152	25	0.9954	0.9954	0.0009	0.9936	0.9973	0.8866	0.8869	0.0226	0.8434	0.9357	37.2	63.2
Incomb CRM+Low inc. BB	44.4	0.0039823407	25	0.9953	0.9953	0.0010	0.9933	0.9973	0.8844	0.8852	0.0240	0.8384	0.9337	37.0	63.6
Incomb CRM+High inc. BB	53.0	0.0047600882	25	0.9944	0.9944	0.0010	0.9925	0.9962	0.8636	0.8645	0.0224	0.8203	0.9076	34.6	65.5
Project alone CRM+Low	4.1	0.0003693140	35	0.9996	0.9996	0.0008	0.9979	1.0011	0.9849	0.9842	0.0297	0.9228	1.0416	48.6	51.0
Project alone CRM+High	5.4	0.0004888103	35	0.9994	0.9994	0.0009	0.9977	1.0011	0.9800	0.9793	0.0315	0.9160	1.0414	48.6	51.4
Incomb CRM+Low ex. BB	38.0	0.0034078988	35	0.9960	0.9960	0.0008	0.9944	0.9977	0.8653	0.8659	0.0266	0.8157	0.9211	37.8	61.7
Incomb CRM+High ex. BB	43.7	0.0039249152	35	0.9954	0.9954	0.0008	0.9937	0.9970	0.8471	0.8471	0.0263	0.7986	0.8995	36.6	63.5
Incomb CRM+Low inc. BB	44.4	0.0039823407	35	0.9953	0.9953	0.0009	0.9937	0.9971	0.8440	0.8445	0.0269	0.7952	0.9015	36.6	63.3
Incomb CRM+High inc. BB	53.0	0.0047600882	35	0.9944	0.9944	0.0008	0.9926	0.9960	0.8157	0.8161	0.0254	0.7651	0.8660	34.0	66.0
Project alone CRM+Low	4.1	0.0003693140	50	0.9997	0.9997	0.0007	0.9982	1.0011	0.9843	0.9844	0.0371	0.9091	1.0583	48.5	51.8
Project alone CRM+High	5.4	0.0004888103	50	0.9996	0.9996	0.0007	0.9981	1.0010	0.9787	0.9797	0.0379	0.9052	1.0518	48.2	51.8
Incomb CRM+Low ex. BB	38.0	0.0034078988	50	0.9972	0.9972	0.0007	0.9957	0.9987	0.8657	0.8672	0.0326	0.8036	0.9315	38.6	60.6
Incomb CRM+High ex. BB	43.7	0.0039249152	50	0.9967	0.9968	0.0007	0.9953	0.9984	0.8463	0.8475	0.0328	0.7862	0.9207	36.3	62.7
Incomb CRM+Low inc. BB	44.4	0.0039823407	50	0.9967	0.9967	0.0007	0.9953	0.9982	0.8436	0.8455	0.0330	0.7874	0.9146	36.6	63.3
Incomb CRM+High inc. BB	53.0	0.0047600882	50	0.9960	0.9960	0.0007	0.9946	0.9976	0.8148	0.8164	0.0320	0.7577	0.8833	34.9	64.8

1221. The C-PGR for Project alone impacts after 35 years for the highest impact scenario of high displacement and WCS collision was 0.9994 (95% c.i. 0.9977-1.0011) (**Table 6-144**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.06%. This small change indicates that the PVA trajectories with Project-alone impacts are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the kittiwake population will be of a similar size after 35 years, in the presence of Project impacts, as would be expected in the absence of Project impacts.

1222. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9944 (95% c.i. 0.9926-0.9960) (**Table 6-144**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.56%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the kittiwake population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Additionally, the Project contributed a mortality of 5.45 birds per annum to the in-combination total of 53.0 birds per annum (including Berwick Bank impacts, worst case scenario).

1223. Kittiwakes using the marine extension of the North Caithness Cliffs SPA might also be disturbed/displaced by vessels in transit to/from Scrabster Harbour but the assessment showed that this was very likely to have no impact on the long-term viability of the population.

1224. The North Caithness Cliffs SPA kittiwake population has undergone a decline and population size is well below citation size. Feature condition is Unfavourable No change, as assessed in June 2023. Population size at this colony decrease by 45% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). However, the North Caithness Cliffs SPA kittiwake population was substantially larger, by 41%, in 2023, compared with the Seabirds Count estimate (Tremlett *et al.*, 2024), suggesting HPAI has not impacted this population.

1225. Whilst the North Caithness Cliffs SPA kittiwake population is in unfavourable condition, it does appear to be stable or increasing, based on counts in 2023. Given the very small decrease in population growth rate predicted to occur in the presence of Project alone impacts, the long-term viability of the population is unlikely to be affected.

1226. However, Project impacts, in-combination with other OWFs impacts, were predicted to slightly reduce population growth rate. Because of this, in-combination impacts could have the potential to further exacerbate any declines and might prevent or reduce the potential for this population to recover.

1227. A conclusion of no AEoSI was reached for the kittwake feature of the North Caithness Cliffs SPA, from collision and displacement impacts from the Project alone.

1228. However, it was not possible to conclude no AEoSI for the kittiwake feature of the North Caithness Cliffs SPA, from collision and displacement impacts from in-combination impacts, which may have the potential to undermine the conservation objective: To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

6.3.20.5.2 Guillemot

1229. Predicted guillemot displacement mortality, by season, and change to annual adult survival rate apportioned to the North Caithness Cliffs SPA population is presented in **Table 6-145**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024). Note, almost all breeding season Project alone guillemot mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

1230. NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts (letter from NatureScot to the Project, dated 3 June 2024). However, Berwick Bank Wind Farm did not have connectivity with any of the SPAs with guillemot features, potentially impacted by the Project and so the in-combination assessment does not include any Berwick Bank impacts.

Table 6-145. Estimated adult guillemot Project alone and in-combination displacement seasonal and annual mortalities apportioned to the North Caithness Cliffs SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination** impacts for more details on calculation of mortalities and changes to survival rate.*

GUILLEMOT	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.01	0.01
Mortality - Non-breeding season (NatureScot)	1.48	4.45
Mortality - Non-breeding season (BDMPS)	1.49	4.46
Annual Project alone*	1.49	4.46
Percentage point change in annual adult survival rate	<0.01%	0.01%
Annual in-combination mortality	92.49	237.96
Percentage point change in annual adult survival rate	0.18%	0.46%

** Sum of displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1231. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was required for Project alone impacts.

1232. Change in adult survival rate due to in-combination impacts did exceed 0.02% and as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

1233. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

1234. **Table 6-146** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the guillemot population at North Caithness Cliffs SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1235. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-146. North Caithness Cliffs SPA: Guillemot PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	1.5	0.000029	25	1.0000	1.0000	0.0003	0.9995	1.0004	0.9991	0.9989	0.0068	0.9858	1.0120	50.0	50.1
Project alone High	4.5	0.000086	25	0.9999	0.9999	0.0003	0.9994	1.0004	0.9975	0.9975	0.0071	0.9841	1.0113	49.2	51.0
Incomb Low	92.5	0.001774	25	0.9980	0.9980	0.0003	0.9976	0.9985	0.9501	0.9502	0.0067	0.9380	0.9630	39.7	62.4
Incomb High	237.9	0.004565	25	0.9949	0.9949	0.0003	0.9944	0.9954	0.8767	0.8764	0.0062	0.8644	0.8887	23.1	77.7
Project alone Low	1.5	0.000029	35	1.0000	1.0000	0.0002	0.9995	1.0003	0.9987	0.9984	0.0077	0.9829	1.0133	49.9	50.3
Project alone High	4.5	0.000086	35	0.9999	0.9999	0.0002	0.9995	1.0003	0.9967	0.9967	0.0080	0.9815	1.0129	49.7	50.6
Incomb Low	92.5	0.001774	35	0.9980	0.9980	0.0002	0.9976	0.9984	0.9315	0.9316	0.0072	0.9186	0.9449	36.5	63.3
Incomb High	237.9	0.004565	35	0.9949	0.9949	0.0002	0.9945	0.9954	0.8329	0.8329	0.0069	0.8196	0.8460	17.9	82.1
Project alone Low	1.5	0.000029	50	1.0000	1.0000	0.0002	0.9996	1.0003	0.9984	0.9983	0.0086	0.9812	1.0147	49.5	50.4
Project alone High	4.5	0.000086	50	0.9999	0.9999	0.0002	0.9996	1.0003	0.9970	0.9967	0.0089	0.9792	1.0142	49.7	50.3
Incomb Low	92.5	0.001774	50	0.9986	0.9986	0.0002	0.9983	0.9989	0.9309	0.9311	0.0082	0.9160	0.9480	38.4	60.5
Incomb High	237.9	0.004565	50	0.9964	0.9964	0.0002	0.9961	0.9967	0.8318	0.8320	0.0077	0.8171	0.8465	22.1	78.3

1236. Predicted Project alone impacts on the guillemot population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required). This means the predicted Project impacts are predicted to not alter guillemot population size or growth rate, compared to what would be expected in the absence of any impacts from the Project.

1237. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement was 0. 0.9949 (95% c.i. 0.9945-0.9954) (**Table 6-146**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.51%. This predicted small change to population growth rate indicates that the guillemot population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of 4.5 birds per annum to the in-combination total of 240 birds per annum (worst case scenario).

1238. The assessment was based on an assumed guillemot displacement rate of 60%, with 5% of displaced birds dying in the breeding season and 3% in the non-breeding season, under the high impact scenario. However, surveys of bird distribution within and outwith the Beatrice OWF development area prior to and following construction and operation of the OWF, have shown no compelling evidence of displacement of guillemots during the breeding season (Trinder *et al.,* 2024). This OWF is relatively close to the Project (approximately 90 km away) and is a similar distance from the coast where colonies of guillemots are breeding, i.e. the ecological conditions under which guillemots are using the Beatrice OWF and the Project are very similar. Evidence of guillemots being displaced from OWFs comes from studies from much further away than Beatrice (Peschko *et al.,* 2020; Peschko *et al.,* 2024). Consequently, it would be reasonable to assume that the proportion of guillemots that would be displaced from the Project during the breeding season would be much lower than the assumed 60%. This would mean that mortality on the North Caithness Cliffs SPA guillemot feature would be considerably less than predicted by this assessment.

1239. The guillemot population at this SPA is similar to citation population size and feature condition is Favourable Maintained, when last assessed in June 2023. Population size at this colony decreased by 45% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023) but the Seabird 2000 count of 70,199 individuals was well above the citation population size of 38,300 individuals. Guillemot populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). Guillemot colonies have shown a mixed response to HPAI impacts, with some increasing and others decreasing. The North Caithness Cliffs SPA was 33% larger, when counted in 2023, compared with the Seabird Count estimate (Tremlett *et al.*, 2024).

1240. Project alone displacement impacts on the North Caithness Cliffs SPA guillemot population were very small and will not affect long-term population size. Project impacts, in-combination with other OWFs' impacts, did indicate that population growth rate could be slightly reduced. However, the population is in favourable condition and there is evidence of recent increases in population size. Furthermore, evidence from the Beatrice OWF suggests that guillemot displacement rates in the breeding season, and hence mortality, would be substantially lower than assumed in this assessment. Consequently, any slight decreases in population growth rate would not be sufficient to prevent or reduce the potential for this population to be maintained at, or above, citation population size.

1241. Consequently, a conclusion of no AEoSI was reached for the guillemot feature of the North Caithness Cliffs SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.20.5.3 Razorbill

1242. Predicted razorbill displacement mortality, by season, and change to annual adult survival rate apportioned to the North Caithness Cliffs SPA population is presented in **Table 6-147.** In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-147. Estimated adult razorbill Project alone and in-combination collision and displacement seasonal and annual mortalities apportioned to the North Caithness Cliffs SPA and change in baseline annual adult survival rate.
*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate*

RAZORBILL	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.35	0.46
Mortality - Non-breeding season (NatureScot)	0.01	0.02
Mortality - Autumn migration (BDMPS)	0.01	0.01
Mortality - Winter (BDMPS)	0.00	0.00
Mortality - Spring migration (BDMPS)	0.01	0.01
Annual Project alone*	0.36	0.48
Percentage point change in annual adult survival rate	0.01%	0.01%
Annual in-combination mortality excl Berwick Bank	5.84	14.29
Percentage point change in annual adult survival rate	0.12%	0.30%
Annual in-combination mortality incl Berwick Bank	6.41	16.01
Percentage point change in annual adult survival rate	0.13%	0.33%

** Sum of displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1243. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1244. Change in adult survival rate due to in-combination impacts did exceed 0.02% and as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

1245. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

1246. **Table 6-148** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the razorbill population at North Caithness Cliffs SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1247. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-148. North Caithness Cliffs SPA: Razorbill PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	0.4	0.00007455285	25	0.9998	0.9999	0.0018	0.9966	1.0035	0.9950	0.9980	0.0474	0.9142	1.1005	48.8	51.3
Project alone High	0.5	0.00010092101	25	0.9997	0.9998	0.0018	0.9965	1.0033	0.9931	0.9962	0.0493	0.9058	1.0979	48.5	51.9
Incomb Low ex. BB	5.8	0.00121725864	25	0.9986	0.9986	0.0018	0.9952	1.0021	0.9632	0.9640	0.0453	0.8822	1.0524	45.6	55.6
Incomb High ex. BB	14.3	0.00297932490	25	0.9964	0.9965	0.0018	0.9929	1.0002	0.9122	0.9126	0.0450	0.8321	1.0078	37.8	61.3
Incomb Low inc. BB	6.4	0.00133655622	25	0.9984	0.9984	0.0018	0.9948	1.0021	0.9594	0.9600	0.0456	0.8753	1.0561	44.9	55.7
Incomb High inc. BB	16.0	0.00333819047	25	0.9960	0.9961	0.0019	0.9926	0.9999	0.9018	0.9049	0.0448	0.8223	0.9979	37.1	63.2
Project alone Low	0.4	0.00007455285	35	0.9999	0.9999	0.0017	0.9967	1.0033	0.9983	0.9995	0.0628	0.8878	1.1267	49.3	50.6
Project alone High	0.5	0.00010092101	35	0.9999	0.9999	0.0017	0.9965	1.0035	0.9944	0.9973	0.0634	0.8788	1.1306	48.7	50.7
Incomb Low ex. BB	5.8	0.00121725864	35	0.9986	0.9986	0.0018	0.9950	1.0019	0.9488	0.9511	0.0611	0.8361	1.0760	44.1	55.5
Incomb High ex. BB	14.3	0.00297932490	35	0.9965	0.9965	0.0017	0.9931	1.0000	0.8826	0.8831	0.0565	0.7778	1.0013	36.5	62.5
Incomb Low inc. BB	6.4	0.00133655622	35	0.9984	0.9985	0.0017	0.9952	1.0018	0.9469	0.9484	0.0583	0.8423	1.0659	42.7	55.3
Incomb High inc. BB	16.0	0.00333819047	35	0.9961	0.9961	0.0018	0.9928	0.9997	0.8685	0.8725	0.0566	0.7683	0.9954	35.5	63.4
Project alone Low	0.4	0.00007455285	50	0.9999	0.9999	0.0017	0.9966	1.0032	0.9939	1.0009	0.0890	0.8407	1.1891	50.3	49.4
Project alone High	0.5	0.00010092101	50	0.9999	0.9999	0.0018	0.9966	1.0036	0.9927	0.9998	0.0929	0.8413	1.2032	49.6	50.5
Incomb Low ex. BB	5.8	0.00121725864	50	0.9990	0.9990	0.0019	0.9953	1.0028	0.9521	0.9554	0.0908	0.7855	1.1545	44.9	54.0
Incomb High ex. BB	14.3	0.00297932490	50	0.9976	0.9976	0.0018	0.9940	1.0012	0.8841	0.8873	0.0860	0.7322	1.0670	38.0	60.8
Incomb Low inc. BB	6.4	0.00133655622	50	0.9988	0.9989	0.0018	0.9956	1.0027	0.9416	0.9489	0.0864	0.7939	1.1505	44.7	54.8
Incomb High inc. BB	16.0	0.00333819047	50	0.9972	0.9972	0.0018	0.9939	1.0008	0.8640	0.8729	0.0822	0.7318	1.0465	36.7	61.5

1248. Predicted Project alone impacts on the razorbill population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required). This means the predicted Project impacts are predicted to not alter razorbill population size or growth rate, compared to what would be expected in the absence of any impacts from the Project

1249. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, including Berwick Bank impacts, was 0.9961 (95% c.i. 0.9928-0.9997) (**Table 6-148).** The predicted reduction in population growth rate under this highest impact worst case scenario was 0.39%. This predicted small change to population growth rate indicates that the razorbill population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of only 0.5 birds per annum to the in-combination total of 16 birds per annum (including Berwick Bank impacts, worst case scenario).

1250. The razorbill population at this SPA is similar to citation population size and feature condition is Favourable Maintained, when last assessed in June 2023. Population size at this colony decreased by 41% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). Razorbill populations are thought to have not been heavily impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). No razorbill colonies were counted in 2023, for the purpose of assessing HPAI impacts (Tremlett *et al.*, 2024).

1251. Project alone displacement impacts on the North Caithness Cliffs SPA razorbill population were very small and will not affect long-term population size. Project impacts, in-combination with other OWFs' impacts, did result in a very small decrease in population growth rate. However, the population is in favourable condition and has not been impacted by HPAI. Consequently, these in-combination impacts would not be sufficient to prevent or reduce the potential for this population to be maintained at, or above, citation population size. Note also that Project annual razorbill mortality at this SPA was < 0.5 birds per annum.

1252. Consequently, a conclusion of no AEoSI was reached for the razorbill feature of the North Caithness Cliffs SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.20.5.4 Puffin

1253. Predicted puffin displacement mortality, by season, and change to annual adult survival rate apportioned to the North Caithness Cliffs SPA population is presented in **Table 6-149**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024). Note, almost all breeding season Project alone puffin mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-149. Estimated adult puffin Project alone and in-combination displacement seasonal and annual mortalities apportioned to the North Caithness Cliffs SPA and change in baseline annual adult survival rate.

***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

PUFFIN	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.02	0.05
Mortality - Non-breeding season (BDMPS)	0.02	0.05
Annual Project alone mortality (displacement)*	0.02	0.05
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination mortality excl Berwick Bank	31.05	52.01
Percentage point change in annual adult survival rate	0.51%	0.86%
Annual in-combination mortality incl Berwick Bank	31.16	52.28
Percentage point change in annual adult survival rate	0.51%	0.86%

** Sum of displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1254. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1255. Change in adult survival rate due to in-combination impacts did exceed 0.02%, but as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

1256. The puffin feature at this SPA is in Unfavourable Declining condition, when last assessed in June 2023. Population size at this colony decreased by 21% between the two seabird censuses, Seabird 2000 and Seabirds Count, for parts of the colony counted using the same methods in both censuses (Burnell *et al.*, 2023) There is no evidence of puffin populations being impacted by the HPAI epidemic and no additional counts of puffins were undertaken in 2023 (Tremlett *et al.*, 2024).

1257. The very small predicted mortality from Project alone and in-combination impacts on this population will not undermine the conservation objectives for this site. Whilst the population is below citation population size and is in Declining condition, the very small mortality from Project alone and in-combination impacts will not prevent or inhibit restoration of the population.

1258. Consequently, a conclusion of no AEoSI was reached for the puffin feature of the North Caithness Cliffs SPA, from displacement and barrier impacts from the Project alone and in-combination.

6.3.20.5.5 Fulmar

1259. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the North Caithness Cliffs SPA population is presented in **Table 6-150**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features

Table 6-150. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities apportioned to the North Caithness Cliffs SPA and change in baseline annual adult survival rate

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.608	1.824
Mortality - Non-breeding season (NatureScot)	0.309	0.927
Mortality - Autumn migration (BDMPS)	0.118	0.355
Mortality - Winter (BDMPS)	0.052	0.155
Mortality - Spring migration (BDMPS)	0.139	0.417
Annual Project alone mortality (displacement)*	0.917	2.751
Percentage point change in annual adult survival rate	0.003%	0.009%

** Sum of displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.*

1260. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required.

1261. The fulmar feature at this SPA is in Favourable Maintained condition, when last assessed in June 2023. There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmars were undertaken in 2023 for the purpose of assessing HPAI impacts (Tremlett *et al.*, 2024).

1262. The very small predicted mortality from Project impacts on this population will not undermine the conservation objectives for this site. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the North Caithness Cliffs SPA, from displacement and barrier effects from the Project alone. No in-combination assessment was undertaken for fulmar.

6.3.20.6 Assessment of vessel impacts alone and in-combination

1263. North Caithness Cliffs SPA has a marine extension, approximately 2 km into the marine environment. This marine extension, classified in 2009, was designated to protect qualifying features when undertaking maintenance behaviours, such as loafing and preening, as well as foraging, adjacent to the colony. The boundary of the marine extension includes an area across Thurso Bay.

1264. Vessels entering and leaving Scrabster Harbour regular transit through the marine component of the North Caithness Cliffs SPA (**Figure 6-32**). The Project will increase the volume of vessels transiting to/from Scrabster Harbour, both during construction and operation. This has the potential to impact Conservation Objectives for this site, including: maintain in the long term, distribution of the species within the site and no significant disturbance of the species (Conservation Objectives from NatureScot SiteLink[48]). Vessels could prevent seabirds within the marine extension of the site from undertaking maintenance behaviours and/or foraging, through the presence of transiting vessels causing disturbance to birds and potentially displacement, if birds move away from vessels.

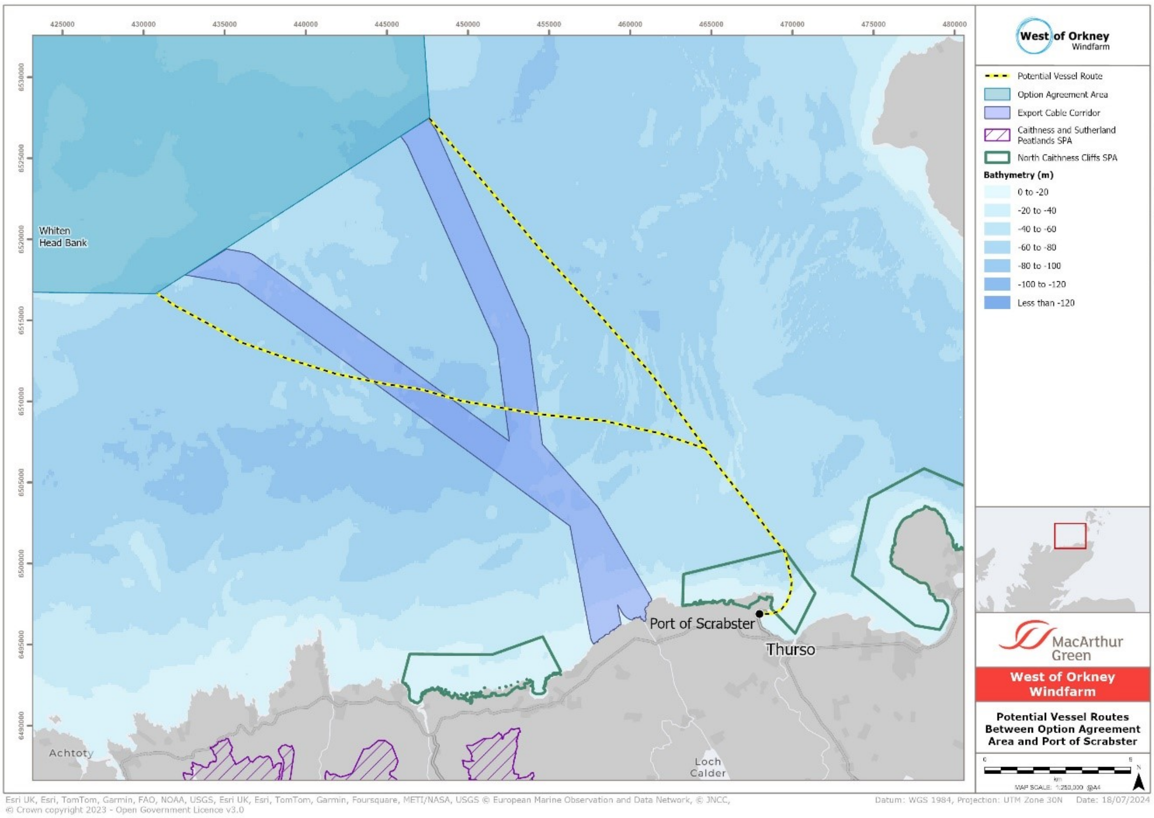


Figure 6-32. Map of the north coast of mainland Scotland, showing the edge of the OAA, the ECC and Scrabster Harbour. An indicative vessel route is presented, showing vessels transiting through the marine extension of the North Caithness Cliffs SPA.

1265. Possible construction operations that would involve vessels using Scrabster Harbour include site: preparation (boulder clearance, UXO management), foundation installation (noise mitigation), WTG installation (commissioning), inter-array and export cable installation (commissioning) and ad-hoc personnel transfer. A worst case estimate was made of the number of one-way transits all vessels would make in each year of the construction programme. The maximum number of vessel transits per annum will vary across the five

[48] SiteLink - North Caithness Cliffs SPA (nature.scot)

years of the construction programme, dependant on operations occurring in each year. The maximum number of vessel transits in any of the five years of construction is 2,726 one way transits. This is a worst case scenario of the maximum possible number of transits and this will be lower in most years of the construction programme.

1266. AIS vessel route information from the MMO showed that at least 2,489 vessels arrived or departed from Scrabster Harbour in 2019 and 3,133 vessels in 2018. (This estimate was derived from using GIS to count the number of vessel tracks passing through a polygon across the entrance to Thurso Bay.) Under a worst-case scenario, Project vessels transiting to/from Scrabster Harbour during Project construction could increase the volume of vessels transiting through the North Caithness Cliffs SPA by between 87% and 109%.

1267. During Project operation, vessels could use Scrabster Harbour for activities including inspection, maintenance and repair of WTGs, cables and substructure. However, it is not yet confirmed which port/harbour vessels performing these activities would use. As worst-case scenario, assuming all vessels use Scrabster Harbour results in an estimated number of one-way transits to/from Scrabster Harbour of 896 transits. Using the same MMO AIS data as a baseline for vessel activity at Scrabster Harbour, of 3,133 vessels in 2018 and 2,489 vessels in 2019, the worst-case scenario for an increase in vessel transits during operation would be an increase between 29% and 36%.

1268. The qualifying features of North Caithness Cliffs SPA that are likely to be using the marine area adjacent to the cliffs are kittiwake, guillemot, razorbill, puffin and, potentially, fulmar[49]. Kittiwakes tend to generally not be disturbed by the presence of vessels and will actually associate with vessels, probably looking for fishing discards (pers. obs. S. O'Brien), whereas, guillemot, razorbill and puffin tend to be slightly more disturbed by the presence of vessels. Furness et al. (2013) gave kittiwake a disturbance score of 2 out of five (one being the lowest sensitivity to vessels) and a disturbance score of 3 for guillemot, razorbill and puffin. Northern fulmars are less likely to be sat on the sea adjacent to the colony and also have a low sensitivity to the presence of vessels (disturbance score of 1 by Furness et al. 2013).

1269. The North Caithness Cliffs SPA is a large site, comprising five SSSI sites. It has a total area of 146 km^2. Vessels from Scrabster Harbour would follow established vessel transit routes through the marine component of the SPA, with approximately 2km of the transit route within the SPA boundary. Assuming that birds were disturbed by the presence of vessels out to a precautionary distance of 1km either side of the vessel track, this would represent an area of 4km^2 over which there was the possibility of birds being disturbed, i.e. only 2.7% of the site. Importantly, this does not equate to 2.7% of the SPA population being disturbed as only a small fraction of birds breeding on the cliffs would be using the adjacent marine area at any one time.

1270. Any disturbance to qualifying features of the North Caithness Cliffs SPA, as well as being spatially limited, would also be intermittent. The disturbance would occur as a vessel passes and for a short period of time afterwards until birds resume their original behaviour. However, the elevated number of transits from current numbers would be a long-term effect

[49] SiteLink - North Caithness Cliffs SPA (nature.scot)

due to the harbour being used both during construction and operation albeit it with fewer transits during Project operation.

1271. Project vessels will follow existing vessel transit routes from the harbour, for navigational safety reasons. **Figure 6-33** shows vessel density which illustrates routes used by vessels in the past, and hence the indicative route that Project vessels would take through the SPA when entering and exiting the harbour. Seabirds using the marine area in the vicinity of Scrabster Harbour transit routes will already be habituated to the presence of vessels and so are unlikely to be significantly disturbed by additional vessels using the same routes. Scrabster Harbour already has frequent vessel movements (2,489 in 2019 and 3,133 in 2018) so seabirds will either be habituated or already displaced prior to additional Project vessel traffic.

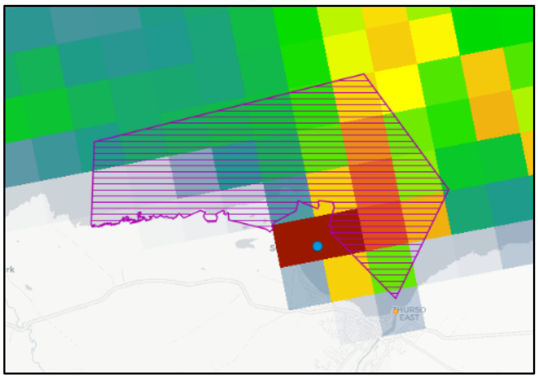


Figure 6-33. Indicative map of vessel movements to and from Scrabster harbour based on existing shipping densities.

6.3.20.7 *Conclusions*

1272. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **North Caithness Cliffs SPA**, from collision and displacement impacts from the **Project alone**. However, it was **not possible to conclude no AEoSI** for the **kittiwake** feature of the **North Caithness Cliffs SPA**, from collision and displacement impacts from **in-combination** impacts, which may have the potential to undermine the conservation objective: To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

1273. A conclusion of **no AEoSI** was reached for the **guillemot** feature of the **North Caithness Cliffs SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1274. A conclusion of **no AEoSI** was reached for the **razorbill** feature of the **North Caithness Cliffs SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1275. A conclusion of **no AEoSI** was reached for the **puffin** feature of the **North Caithness Cliffs SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1276. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **North Caithness Cliffs SPA**, from displacement impacts from the **Project alone**.

1277. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, guillemot, razorbill, puffin and fulmar. A conclusion of no AEoSI was reached for all features, with the exception of kittiwake, for which it was not possible conclude no AEoSI for in-combination impacts. Consequently, a conclusion of **no AEoSI** for **Project alone** impacts on the **breeding seabird assemblage** feature of the **North Caithness Cliffs SPA** was reached**.**It was **not possible to conclude no AEoSI** for **in-combination** impacts on the **breeding seabird assemblage** feature of the **North Caithness Cliffs SPA** was reached.

1278. Based on the above assessment, a conclusion of no AEoSI for Project alone impacts on the North Caithness Cliffs SPA was reached. it was not possible to conclude no AEoSI for in-combination impacts on the North Caithness Cliffs SPA.

6.3.20.8 Potential mitigation measures

1279. An outline Navigational Safety and Vessel Management Plan (NSVMP) was submitted with the West of Orkney Windfarm application[50]. This will be further developed post-consent, once there is certainty over which ports/harbours will be used during construction and operation. Vessels will be required to adhere to the NSVMP, including adhering to embedded mitigation measures and to follow existing shipping routes where possible.

1280. Despite the conclusion of no AEoSI from vessel disturbance/displacement impacts, the following mitigation measures are proposed to ensure no AEoSI:

- Project vessels will limit their speed while transiting through the SPA to 10 kts or less;
- Pre construction / mobilisation briefings will be used to highlight bird sensitivity to vessel movements and the mitigations required in order to minimise potential impacts to birds in marine SPAs;
- The vessel crew will watch for aggregations of seabirds on the water and, if aggregations are seen, will alert the vessel's Master. Where necessary and having regard to maritime safety, the vessel's course and/or speed will be adjusted to avoid aggregations of birds.

1281. Limiting a vessel's speed will reduce disturbance as marine birds have been shown to be less likely to be displaced by slower moving vessels. It will also reduce engine noise, which can also disturb birds. Avoiding aggregations of birds on the water will also reduce disturbance.

[50] omp4 - outline navigation and safety and vessel management plan.pdf (marine.gov.scot).

6.3.21 Noss SPA

6.3.21.1 *Site Description*

1282. The Noss SPA was classified 16 August 1996, with marine extension classified on 25 September 2009, due to its populations of breeding seabirds. The site is approximately 207 km north-east of the Project.

1283. Noss SPA is an offshore island lying 5 km east of Lerwick, Shetland. It supports breeding seabirds on cliffs and also on inland heathlands and grasslands. The boundary of the SPA overlaps that of the Noss SSSI and National Nature Reserve and the seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface.

6.3.21.2 *Conservation Objectives for the SPA*

1284. The conservation objectives of the Noss SPA are to:

- 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
- 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.

6.3.21.3 *Qualifying features*

1285. The qualifying features of the SPA are presented below in **Table 6-151**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

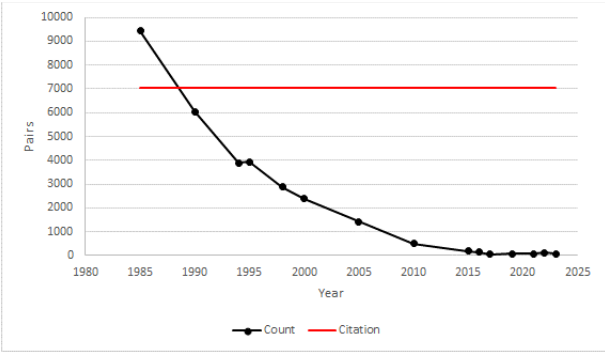
Table 6-151 Qualifying interests and condition for the Noss SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake*	7,020 pairs, 1% of the GB population	179 pairs	Unfavourable Declining	1 June 2023	Red
Great skua	420 pairs, 5% of EC, and 3% of western European	476 pairs	Unfavourable Declining	1 June 2023	Amber
Guillemot	38,970 individuals 3% of EC and 1% of western European	24,456 individuals	Unfavourable No change	1 June 2023	Amber

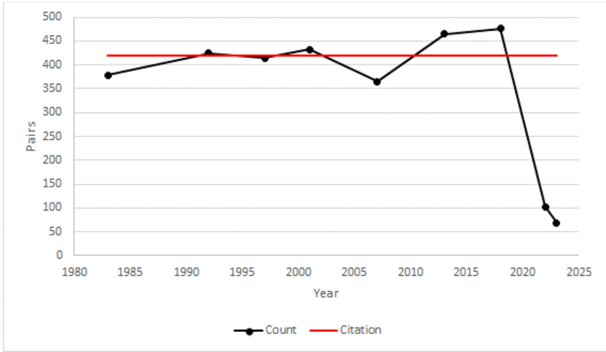
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Puffin*	2,348 individuals, over 10% of the minimum qualifying assemblage of 20,000 individuals	1,174 pairs	Unfavourable Declining	1 June 2023	Red
Fulmar*	6,350 pairs, 1% of the GB population	5,092 pairs	Unfavourable No change	1 June 2022	Amber
Gannet	6,860 pairs, 3% of the western European breeding population	13,765 pairs	Favourable Maintained	1 June 2023	Amber
Seabird assemblage	regularly supports 35,000 seabirds	n/a	Unfavourable Declining	1 May 2017	n/a

1286. Noss SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 35,000 seabirds including nationally important populations of the following species: black-legged kittiwake, Northern gannet, Northern fulmar, great skua, common guillemot and Atlantic puffin.

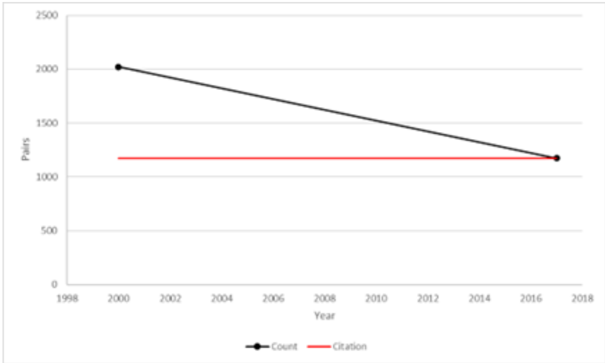
1287. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage), colony count data between 1989 and 2023 (the most recent count) was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-34**).



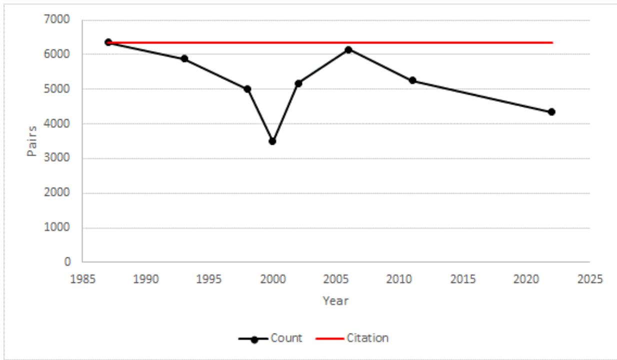
Kittiwake



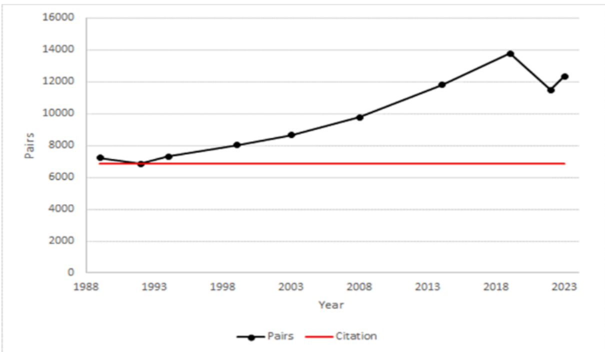
Great skua



Puffin



Fulmar



Gannet

Figure 6-34. Noss SPA qualifying feature population trends from 1989 - 2014 (citation population size shown by red line).

6.3.21.4 *Potential for the Project to impact the site's conservation objectives*

1288. The Noss SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Collision impacts from the offshore Project during operation on the **great skua** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **puffin** qualifying feature, during the breeding and non-breeding season;

- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **gannet** qualifying feature, during the breeding and non-breeding season
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

1289. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

1290. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

1291. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.21.5 *Assessment of predicted impacts for Project alone and in-combination*

6.3.21.5.1 Kittiwake

1292. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Noss SPA population is presented in **Table 6-152**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-152. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the Noss SPA and change in baseline annual adult survival rate.
See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.03	0.01	0.03	0.02

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Autumn migration (BDMPS)	0.01	0.00	0.01	0.01
Mortality - Spring migration (BDMPS)	0.02	0.00	0.02	0.01
Annual Project alone mortality (collision + displacement)*	0.04		0.05	
Percentage point change in annual adult survival rate	0.01%		0.01%	
Annual in-combination excl Berwick Bank	1.37		1.46	
Percentage point change in annual adult survival rate	0.38%		0.41%	
Annual in-combination incl Berwick Bank	1.63		1.85	
Percentage point change in annual adult survival rate	0.46%		0.52%	

**Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1293. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1294. Change in adult survival rate due to in-combination impacts did exceed 0.02% but, as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

1295. The kittiwake feature condition was Unfavourable Declining, when last assessed in June 2023. Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). Counts at the Noss SPA in 2023 found a 17% decrease in kittiwake AONs at this site, suggesting HPAI has impacted this population.

1296. Whilst this population has declined and is below citation population size, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any further declines and to not prevent or reduce the potential for this population to recover and to be restored in the long term.

1297. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the Noss SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.21.5.2 Great skua

1298. Predicted great skua collision mortality, by season, and change to annual adult survival rate apportioned to the Noss SPA population is presented in **Table 6-153**. In-combination impacts from other OWFs apportioned no great skua mortality to this SPA, so no further assessment of in-combination impacts is required.

Table 6-153. Estimated adult great skua Project alone collision seasonal and annual mortalities (birds per annum) apportioned to the Noss SPA and change in baseline annual adult survival rate.

***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

GREAT SKUA	Collision (WCS)
Mortality - Breeding season (NatureScot)	0.00
Mortality - Non-breeding season (NatureScot)	0.01
Mortality - Autumn migration (BDMPS)	0.00
Mortality - Winter (BDMPS)	0.00
Mortality - Spring migration (BDMPS)	0.01
Annual Project alone mortality* (collision)	0.01
Percentage point change in annual adult survival rate	<0.01%

** Sum of collision mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1299. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1300. Great skua feature condition is Unfavourable Declining, when last assessed in June 2023. Great skua populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). Counts of great skuas at Noss SPA in 2023 found an 86% decrease in population size, to 69 Apparently Occupied Territories (Tremlett *et al.,* 2024). This is far below the citation population size of 420 pairs.

1301. Whilst this population has undergone a substantial, the very small Project alone impacts (0.01 birds per annum) and the absence of any in-combination impacts will not prevent or reduce the potential for this feature to recover and to be restored, in the long term.

1302. Consequently, a conclusion of no AEoSI was reached for the great skua feature of the Noss SPA, from collision impacts from the Project alone and in-combination.

6.3.21.5.3 Puffin

1303. Predicted puffin displacement mortality, by season, and change to annual adult survival rate apportioned to the Noss SPA population is presented in **Table 6-154**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

1304. Note, almost all breeding season Project alone puffin mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-154. Estimated adult puffin Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the Noss SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

PUFFIN	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.01	0.04
Mortality - Non-breeding season (BDMPS)	0.01	0.04
Annual Project alone mortality* (displacement)	0.01	0.04
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination excl. Berwick Bank	0.35	0.79
Percentage point change in annual adult survival rate	0.01%	0.03%
Annual in-combination incl. Berwick Bank	0.40	0.96
Percentage point change in annual adult survival rate	0.02%	0.04%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1305. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1306. Change in adult survival rate due to in-combination impacts did exceed 0.02% but, as Project alone mortality was less than 0.2 birds per annum, a PVA was not required to assess in-combination impacts.

1307. Predicted Project alone and in-combination impacts on puffin were sufficiently small to not warrant further investigation of population response to impacts (i.e. no PVA was required). Project alone mortality was estimated to be 0.01 birds per annum.

1308. Puffin feature condition is Unfavourable Declining, when last assessed in June 2023. There is no evidence of puffin populations being impacted by the HPAI epidemic and no additional counts of puffins at Noss SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

1309. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be maintained.

1310. Consequently, a conclusion of no AEoSI was reached for the puffin feature of the Noss SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.21.5.4 Gannet

1311. Predicted gannet collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Noss SPA population is presented in **Table 6-155**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

1312. Note, almost all breeding season Project alone gannet mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-155. Estimated adult gannet Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the Noss SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

GANNET	Collision (WCS)	Low Displacement (70%/1%)	Collision (WCS)	High Displacement (70%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.37	0.38	0.37	1.15
Mortality - Autumn migration (BDMPS)	0.27	0.33	0.27	0.98
Mortality - Spring migration (BDMPS)	0.10	0.05	0.10	0.16
Annual Project alone mortality (collision + displacement)*	0.75		1.52	
Percentage point change in annual adult survival rate	<0.01%		<0.01%	
Annual in-combination mortality excl Berwick Bank	50.27		68.34	
Percentage point change in annual adult survival rate	0.18%		0.25%	
Annual in-combination mortality incl Berwick Bank	51.23		69.30	
Percentage point change in annual adult survival rate	0.19%		0.25%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1313. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1314. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

1315. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts

1316. **Table 6-156** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the gannet population at Noss SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1317. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-156. Noss SPA: Gannet PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	0.8	0.00002733717	25	1.0000	1.0000	0.0005	0.9991	1.0009	0.9994	0.9995	0.0124	0.9754	1.0243	50.2	49.7
Project alone CRM+High	1.5	0.00005506800	25	1.0000	1.0000	0.0005	0.9990	1.0008	0.9989	0.9987	0.0126	0.9735	1.0233	49.9	50.1
Incomb CRM+Low ex. BB	50.3	0.00182608381	25	0.9979	0.9979	0.0005	0.9970	0.9988	0.9462	0.9463	0.0120	0.9225	0.9688	37.9	62.3
Incomb CRM+High ex. BB	68.3	0.00248232452	25	0.9971	0.9971	0.0005	0.9962	0.9980	0.9265	0.9269	0.0117	0.9053	0.9488	33.2	66.4
Incomb CRM+Low inc. BB	51.2	0.00186097506	25	0.9978	0.9978	0.0005	0.9969	0.9988	0.9452	0.9451	0.0125	0.9209	0.9696	37.4	61.7
Incomb CRM+High inc. BB	69.3	0.00251721578	25	0.9971	0.9970	0.0005	0.9961	0.9979	0.9259	0.9258	0.0118	0.9013	0.9476	33.2	66.8
Project alone CRM+Low	0.8	0.00002733717	35	1.0000	1.0000	0.0004	0.9992	1.0007	0.9991	0.9992	0.0143	0.9718	1.0264	49.1	50.5
Project alone CRM+High	1.5	0.00005506800	35	0.9999	0.9999	0.0004	0.9991	1.0008	0.9976	0.9979	0.0145	0.9691	1.0271	49.1	50.6
Incomb CRM+Low ex. BB	50.3	0.00182608381	35	0.9979	0.9979	0.0004	0.9971	0.9986	0.9254	0.9258	0.0135	0.8994	0.9523	35.1	63.4
Incomb CRM+High ex. BB	68.3	0.00248232452	35	0.9971	0.9971	0.0004	0.9963	0.9978	0.8999	0.8998	0.0135	0.8745	0.9262	30.3	68.2
Incomb CRM+Low inc. BB	51.2	0.00186097506	35	0.9978	0.9978	0.0004	0.9970	0.9987	0.9246	0.9244	0.0143	0.8962	0.9527	34.6	63.4
Incomb CRM+High inc. BB	69.3	0.00251721578	35	0.9971	0.9970	0.0004	0.9963	0.9979	0.8987	0.8987	0.0135	0.8734	0.9252	29.9	68.1
Project alone CRM+Low	0.8	0.00002733717	50	1.0000	1.0000	0.0003	0.9993	1.0006	0.9991	0.9991	0.0167	0.9647	1.0329	49.1	51.0
Project alone CRM+High	1.5	0.00005506800	50	1.0000	1.0000	0.0003	0.9993	1.0006	0.9979	0.9978	0.0171	0.9642	1.0332	49.5	50.8
Incomb CRM+Low ex. BB	50.3	0.00182608381	50	0.9985	0.9985	0.0003	0.9978	0.9992	0.9248	0.9251	0.0158	0.8954	0.9572	37.3	62.8
Incomb CRM+High ex. BB	68.3	0.00248232452	50	0.9979	0.9979	0.0003	0.9973	0.9986	0.8982	0.8991	0.0156	0.8682	0.9297	33.0	67.4
Incomb CRM+Low inc. BB	51.2	0.00186097506	50	0.9985	0.9984	0.0003	0.9978	0.9991	0.9241	0.9237	0.0165	0.8910	0.9544	37.2	63.5
Incomb CRM+High inc. BB	69.3	0.00251721578	50	0.9979	0.9979	0.0003	0.9972	0.9985	0.8974	0.8978	0.0157	0.8664	0.9282	32.3	68.0

1318. Predicted Project alone impacts on the gannet population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

1319. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0. 9970 (95% c.i. 0.9963-0.9979) (**Table 6-156**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.3%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the gannet population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Additionally, the Project contributed a mortality of only 1.5 birds per annum to the in-combination total of 69 birds per annum (including Berwick Bank impacts, worst case scenario).

1320. The gannet feature condition was Favourable Maintained, when last assessed in June 2023. The Noss SPA colony, like many gannet populations, has undergone a large increase and is above citation population size of 6,860 pairs. Population size at this colony increased by 59% between the two seabird censuses, Seabird 2000 and Seabirds Count, to 13,765 AOS/AON pairs (Burnell *et al.*, 2023). Gannet populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The Noss SPA gannet population had decreased by 10% when counted in 2023, to 12,335 AON, meaning the population is still well above citation population size.

1321. The gannet population at Noss SPA, is highly likely to continue growing strongly, following the HPAI impacts, especially given evidence of immunity to the disease in gannets (Lane *et al.,* 2023). As the Project alone and in-combination impacts on this population are predicted to be very small they will not exacerbate any future declines which may occur and will not prevent or reduce the potential for this population to be maintained.

1322. Consequently, a conclusion of no AEoSI was reached for the gannet feature of the Noss SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.21.5.5 Fulmar

1323. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the Noss SPA population is presented in **Table 6-157**. No in-combination assessment was possible for fulmar since no other OWFs hae undertaken a quantitative assessment of impacts to fulmar qualifying features.

Table 6-157. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities (birds per annum) apportioned to the Noss SPA and change in baseline annual adult survival rate.
See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.004	0.011
Mortality - Non-breeding season (NatureScot)	0.126	0.377
Mortality - Autumn migration (BDMPS)	0.048	0.144
Mortality - Winter (BDMPS)	0.021	0.063
Mortality - Spring migration (BDMPS)	0.057	0.170
Annual Project alone mortality* (displacement)	0.129	0.388
Percentage point change in annual adult survival rate	0.001%	0.004%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1324. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination assessment was undertaken for fulmar.

1325. Fulmar feature condition is Unfavourable No Change, when last assessed in June 2023. There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmars at Noss SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

1326. The very small predicted mortality from Project impacts on this population will not prevent or reduce the potential for this feature to be restored in the long term.

1327. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the Noss SPA, from displacement and barrier impacts from the Project alone. No in-combination assessment was undertaken for fulmar.

6.3.21.6 Conclusions

1328. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Noss SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1329. A conclusion of **no AEoSI** was reached for the **great skua** feature of the **Noss SPA**, from collision impacts from the **Project alone** and **in-combination** with other OWFs.

1330. A conclusion of **no AEoSI** was reached for the **puffin** feature of the **Noss SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1331. A conclusion of **no AEoSI** was reached for the **gannet** feature of the **Noss SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1332. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Noss SPA**, from displacement and barrier impacts from the **Project alone**

1333. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, great skua, puffin, gannet and fulmar, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Noss SPA**.

1334. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Noss SPA** was reached.

6.3.22 Orkney Mainland Moors SPA

6.3.22.1 *Site Description*

1335. The Orkney Mainland Moors SPA was classified on 13 October 2000. The extended site was classified on 7 July 2008, due to its population of breeding red-throated divers, hen harriers and short-eared owls. The SPA is approximately 41 km east of the Project.

1336. Orkney Mainland Moors Special Protection Area (SPA) comprises four areas of moorland on Mainland, Orkney. The predominant habitats include extensive areas of blanket bog, acid grassland, wet and dry heath, acidic raised-mire and calcareous valley mire. Acid conditions predominate but botanically rich alkaline flushes occur. Sheltered valleys and dales support willow scrub, tall-herb and flush vegetation. There are several small oligotrophic lochs on the site.

1337. The boundaries of the SPA are coincident with those of West Mainland Moorlands SSSI (including the extension at Sleet Moss), Glims Moss & Durkadale SSSI, Orphir & Stenness Hills SSSI, and Keelylang & Swartabeck Burn SSSI.

6.3.22.2 *Conservation Objectives for the SPA*

1338. The conservation objectives of the Orkney Mainland Moors SPA are:

- 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
- 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.

6.3.22.3 *Qualifying features*

1339. The qualifying features of the SPA are presented below in **Table 6-158**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

Table 6-158. Qualifying interests and condition for the Orkney Mainland Moors SPA.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Hen harrier (breeding and non-breeding)	average of 28 breeding females, 5.9% of GB; average of 13 wintering individuals between 1994 and 1998, 2% of GB	n/a	Favourable Maintained	17 March 2013	Red
Red-throated diver (breeding)	average of 18 breeding pairs, 2% of GB	n/a	Favourable Maintained	31 July 2007	Green
Short-eared owl (breeding)	average of 19 breeding pairs between 1993 and 1995, 2% of GB	n/a	Favourable Maintained	15 June 2004	Amber

1340. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) count data was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed.

6.3.22.4 Potential for the Project to impact the site's conservation objectives

1341. The Orkney Mainland Moors SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying feature:

- Displacement impacts from vessel activity outwith the offshore Project area during construction, on the **red-throated diver** qualifying feature, during the breeding season.

1342. LSE was ruled out for the other qualifying features. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

1343. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

1344. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives. Note, the functionally connected site of Scapa Flow SPA, which is used by red-throated divers for foraging and other maintenance activities during the breeding season, was screened in for disturbance/displacement of breeding red-throated divers by vessels transiting to/from the port of Scapa Deep Water Quay during construction. If the conservation objectives of Scapa Flow SPA are undermined, with respect to the red-throated diver qualifying feature, there may be a knock-on effect on the Orkney Mainland Moors SPA feature too. However, this would undermine the above conservation objective for the Orkney Mainland Moors SPA rather than any other of the objectives.

6.3.22.5 *Assessment of predicted impacts for Project alone and in-combination*

6.3.22.5.1 Red-throated diver

1345. The red-throated diver qualifying feature of the Orkney Mainland Moors SPA could be affected if divers from this site are disturbed/displaced while foraging or undertaking other key maintenance behaviours in Scapa Flow. At this stage the Project has not confirmed which ports/harbours will be used during construction and operation but if the Project decides to use the port of Scapa Deep Water Quay for construction, vessels could transit through Scapa Flow on transit to/from the offshore Project area. This impact pathway could impact both the red-throated diver feature of the Scapa Flow SPA and the Orkney Mainland Moors SPA. The impacts of vessels transiting through Scapa Flow on the red-throated diver feature of that SPA is assessed in detail, under the Scapa Flow SPA account (see **Section 6.3.25**).

1346. If vessel activity in Scapa Flow causes disturbance and displacement of red-throated divers, this might reduce their ability to forage for themselves and/or to provision their chicks. Consequently, vessel activity in Scapa Flow associated with Scapa Deep Water Quay is also an impact pathway for LSE for this feature of Orkney Mainland Moors SPA.

Red-throated diver distribution in Scapa Flow during the breeding season is concentrated in shallow inshore areas around Hoy and the western end of mainland Orkney, in the vicinity of their breeding grounds. If Scapa Deep Water Quay is used as a construction port for the Project, vessel activity would be concentrated along existing transit routes through the middle of Scapa Flow. There is virtually no overlap between potential vessel routes that Project vessels would use and the red-throated diver distribution. Consequently, there will be no or very little disturbance/displacement to the breeding red-throated diver feature of Scapa Flow SPA. In turn, this also means no impacts on the long-term viability of the red-throated diver feature of the Orkney Mainland Moors SPA.

6.3.22.6 *Conclusions*

1347. A conclusion of no AEoSI was reached for disturbance/displacement by vessels during Project construction for the red-throated diver feature of Scapa Flow SPA and consequently, **no AEoSI** is also concluded for the **red-throated diver** feature of the **Orkney Mainland Moors SPA**, both from **Project alone and in-combination impacts**.

1348. Based on the above assessment, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Orkney Mainland Moors SPA** was reached.

6.3.23 Outer Firth of Forth and St Andrews Bay Complex SPA

6.3.23.1 *Site Description*

1349. The Outer Firth of Forth and St Andrews Bay Complex SPA was classified in December 2020, due to its populations of breeding seabirds and non-breeding waterbirds. The site is on the east coast of mainland Scotland and is approximately 266 km south-east of the Project.

1350. The Outer Firth of Forth and St Andrews Bay Complex Special Protection Area (SPA) is a large estuarine/marine site on south-east coast of Scotland consisting of the two closely adjacent Firths of Forth and Tay. In the mid Firth of Forth a belt of mud-rich sediments lies between areas of sandy gravels and shell material on either side along the shore. As the estuary widens towards the outer firth, there are extensive areas of sandy and gravelly muds and fine sediments. In contrast St Andrews Bay contains clean sands and gravel with only small areas of muddy sediments. Water depth is variable but large areas, in both the Firth of Forth and St Andrews Bay, are shallow and less than 10m deep. The area supports a wide variety of both pelagic and demersal fish, including sandeels, and crustaceans, molluscs and marine worms, all of which, especially sandeels, comprise the prey of the waterfowl species

6.3.23.2 *Conservation benefits*

1351. The conservation benefits for the Outer Firth of Forth and St Andrews Bay Complex SPA are:

- Protecting the largest GB wintering concentration of red-throated diver (an Annex 1 rare and vulnerable species) in Scotland, contributing over 5% (approximately 850 birds) of the GB population;
- Protecting important numbers of the Slavonian grebe (an Annex 1 rare and vulnerable species), contributing around 3% (approximately 30 birds) of GB wintering population;
- Protecting the following important populations of non-breeding migratory waterfowl that regularly winter in this area: the largest wintering concentration of common eider in Scotland (over 35% of the GB population), the third largest wintering concentration of long-tailed duck in Scotland (around 18% of the GB population), the second largest concentration of common scoter in Scotland (around 5% of the GB population), the second largest concentration of velvet scoter in Scotland (over 31% of the GB population), the second largest concentration of common goldeneye in Scotland (around 3% of the GB population), and the second largest wintering concentration of red-breasted merganser in Scotland (over 5% of the GB population). Some of the common eider and red-breasted merganser may be present throughout the year and will contribute to the breeding population in the area;
- Protecting internationally important numbers of seabirds during the breeding season including Arctic tern and common tern (Annex 1 rare and vulnerable species), Atlantic puffin (largest known breeding aggregation in UK waters), European shag, northern gannet (second largest aggregation in GB waters), black-legged kittiwake (largest known breeding aggregation in UK waters), common guillemot, herring gull and Manx shearwaters;

- Protecting the following important populations of seabirds during the non-breeding season: common guillemot (one of the largest aggregations in UK waters), European shag, kittiwake, and razorbill;
- Protecting the largest known Scottish wintering concentration of little gull, and the largest wintering concentrations of black-headed gull, common gull and herring gull in Scottish coastal waters;
- Protecting waters with rich marine habitats that support a diversity of pelagic and demersal fish, bivalve molluscs, gastropods and crustaceans where the protected features can feed, moult, roost, and perform other maintenance activities.

6.3.23.3 Conservation Objectives for the SPA

1352. The high-level conservation objectives of the Outer Firth of Forth and St Andrews Bay Complex SPA are to:

    1. To ensure that the qualifying features of the Outer Firth of Forth and St Andrews Bay Complex SPA are in favourable condition and make an appropriate contribution to achieving Favourable Conservation Status.
    2. To ensure that the integrity of the Outer Firth of Forth and St Andrews Bay Complex SPA is restored in the context of environmental changes by meeting objectives 2a, 2b and 2c for each qualifying feature:
        a. The populations of the qualifying features are viable components of the Outer Firth of Forth and St Andrews Bay Complex SPA.
        b. The distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species.
        c. The supporting habitats and processes relevant to qualifying features and their prey resources are maintained, or where appropriate restored, at the Outer Firth of Forth and St Andrews Bay Complex SPA.

1353. Of particular relevance to the West of Orkney Windfarm is Conservation Objective 2b, due to the Outer Firth of Forth and St Andrews Bay Complex SPA being screened into the Appropriate Assessment for LSE from vessels associated with the Project having the potential to cause disturbance and displacement to the distribution of qualifying features. This Conservation Objective seeks to ensure that the qualifying features can continue to use and access all areas within the SPA used for feeding, moulting, roosting, loafing, shelter and other maintenance activities.

1354. 'Significant disturbance' should be interpreted to mean disturbance that affects the integrity of the site through alteration of the distribution of the qualifying features such that recovery cannot be expected or effects can be considered long term. It is expected that significant disturbance will lead to more than a transient effect on the distribution of the qualifying features. It may result in the following types of effect:

- Contributes to the long-term decline in the use of the site by the qualifying features;
- Changes to the distribution of the qualifying features on a continuing or sustained basis;

- Changes to the qualifying features behaviour such that it reduces the ability of the species to survive, breed or rear their young.

6.3.23.4 *Qualifying features*

1355. Species listed in **Table 6-159** are qualifying interest features of the Outer Firth of Forth and St Andrews Bay Complex SPA. Information on feature condition and assessment date was taken from the Conservation and Management Advice[51] for the site. Since classification of this site in 2020, waterfowl, non-breeding razorbill and wintering gull features have not been assessed but evidence suggests no deterioration since classification, hence 'favourable' condition in **Table 6-159**. Feature condition with respect to breeding seabird features is based on the relevant functionally-linked breeding seabird colony. The origin of Manx shearwater using the Outer Firth of Forth and St Andrews Bay Complex SPA is not known.

Table 6-159. Qualifying interests and condition for the Outer Firth of Forth and St Andrews Bay Complex SPA. Named components of the breeding seabird assemblage, which are not features in their own right, are indicated by *; named components of the non-breeding seabird assemblage which are not features in their own right are indicated by [x]; named components of the non-breeding season waterfowl assemblage which are not features in their own right are indicated by [+].

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status (UK)
Non-breeding season waterfowl features:					
Red-throated diver	a mean peak estimate of 851 individuals; 5.0% of the Great Britain population	n/a	Favourable Maintained	18 March 2005	Green
Slavonian grebe	an average of 30 individuals (2.7% of the Great Britain population)	n/a	Favourable Maintained	18 March 2005	Red
Common eider	21,546 individuals 2.1% of the biogeographic population and 35.9% of the Great Britain population	n/a	Favourable Maintained	18 March 2005	Amber
Long-tailed duck[+]	1,948 individuals, 17.7% of the Great Britain population	n/a	Favourable Maintained	18 March 2005	Red
Common scoter[+]	4,677 individuals, 4.7% of the Great Britain population	n/a	Favourable Maintained	18 March 2005	Red
Velvet scoter[+]	775 individuals, 31% of the Great Britain population	n/a	Favourable Maintained	18 March 2005	Red
Common goldeneye[+]	589 individuals, 2.9%	n/a	Favourable Maintained	18 March 2005	Red

[51] Conservation_and_Management_Advice_10478.pdf

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status (UK)
	of the Great Britain population				
Red-breasted merganser⁺	431 individuals, 5.1% of the Great Britain population	n/a	Favourable Maintained	18 March 2005	Amber
Seabird breeding and non-breeding features:					
Arctic tern (breeding)	feeding Arctic tern from the adjacent breeding colonies	n/a	Favourable Maintained	18 March 2005	Amber
Common tern (breeding)	feeding common tern from the adjacent breeding colonies	n/a	Favourable Maintained	18 March 2005	Amber
European shag[x] (breeding and non-breeding season)	Breeding: foraging European shag from the nearby colonies. Non-breeding: 2,426 individuals, 2.2% of the Great Britain population	n/a	Favourable Maintained	18 March 2005	Red
Northern gannet (breeding)	10,945 individuals, 1.4% of biogeographical population and 2.7% of the Great Britain population	n/a	Favourable Maintained	18 March 2005	Amber
Atlantic puffin* (breeding)	61,086 individuals, 5.3% of the Great Britain population	n/a	Favourable Maintained	18 March 2005	Red
Kittiwake*[x] (breeding)	12,020 individuals,1.6% of the Great Britain population	n/a	Favourable Maintained	18 March 2005	Red
Manx shearwater* (breeding)	2,885 individuals, more than 2,000 individuals	n/a	Favourable Maintained	18 March 2005	Amber
Common guillemot*[x] (breeding and non-breeding season)	Breeding season: 28,123 individuals, more than 2,000 individuals. Non-breeding season: 21,968 individuals, more than 2,000 individuals	n/a	Favourable Maintained	18 March 2005	Amber
Razorbill[x] (non-breeding season)	5,481 individuals, more than 2,000 individuals	n/a	Favourable Maintained	18 March 2005	Amber

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status (UK)
Herring gull* (breeding)	3,044 individuals, 1.1% of the Great Britain population	n/a	Favourable Maintained	18 March 2005	Red
Wintering gull features:					
Kittiwake*[x]	3,191 individuals, more than 2,000 individuals	n/a	Favourable Maintained	18 March 2005	Red
Little gull	126 individuals; more than 50 individuals	n/a	Favourable Maintained	18 March 2005	Green
Black-headed gull[x]	26,835 individuals,1.2% of the Great Britain population	n/a	Favourable Maintained	18 March 2005	Amber
Common gull[x]	14,647 individuals, 2.1% of the Great Britain population	n/a	Favourable Maintained	18 March 2005	Amber
Herring gull	12,313 individuals, 1.7% of the Great Britain population				Red
Assemblage features:					
Breeding seabird assemblage (named components: Atlantic puffin, black-legged kittiwake, Manx shearwater, common guillemot and herring gull	in excess of 20,000 individual seabirds during the breeding season including nationally important populations	n/a	Condition Not Assessed	n/a	n/a
Non-breeding seabird assemblage (named components: black-headed gull, common gull, herring gull, common guillemot, European shag, black-legged kittiwake, razorbill)	in excess of 20,000 individual seabirds during the non-breeding season including nationally important populations	n/a	Favourable Maintained	18 March 2005	n/a
Non-breeding season waterfowl assemblage (named components: long-tailed duck, common scoter, velvet scoter, common goldeneye, red-breasted merganser)	in excess of 20,000 individual waterfowl including nationally important populations	n/a	Favourable Maintained	18 March 2005	n/a

6.3.23.5 *Potential for the Project to impact the site's Conservation Objectives*

1356. The Outer Firth of Forth and St Andrews Bay Complex SPA was screened in for further assessment due to potential disturbance/displacement of site's diver, seaduck and shag qualifying features, by vessels associated with the Project.

1357. Currently, the Applicant is not able to confirm which ports or harbours will be used for construction activities. Potential ports for marshalling and/or assembly are: Scapa Flow Deep water Quay, Port of Nigg, Port of Cromarty, Ardersier, Aberdeen (logistics only as unsuitable for marshalling or assembly), Leith or Dundee.

1358. If the Applicant decides to use the ports of Dundee or Leith, vessels associated with the Project would pass through the Outer Firth of Forth and St Andrews Bay Complex SPA when transiting between the ports and the Project.

1359. During operation, smaller vessels associated with routine maintenance will come from the Operations and Maintenance base which, for the purposes of this assessment, is assumed to be in Scrabster. Vessels transiting between the base and the offshore Project would transit through the North Caithness Cliffs SPA marine extension (see North Caithness Cliffs SPA account for assessment of this impact pathway). However, Dundee or Leith may be used occasionally by vessels required for specific maintenance tasks. These vessels will be very few in number and will be transiting between the port and Project for only a short period. Therefore, vessels associated with the operation & maintenance phase of the Project will have either no impact or a very small impact on the qualifying features of the Outer Firth of Forth and St Andrews Bay Complex SPA and so no AEoSI can be concluded for vessel impacts arising during operation. The potential for vessels associated with the construction and decommissioning phase of the Project to impact the site's conservation objectives are considered further.

1360. Forth Ports Dundee has extensive storage facilities, deep water berths and heavy lift quayside. This port has been used during construction by OWFs, including Neart na Gaoithe and Seagreen. Forth Ports Leith is Scotland's largest deep-water port, capable of handling large vessels. A number of offshore wind farm projects have used the port for storage of wind farm components.

6.3.23.5.1 Estimated vessels numbers and the relative increase in vessels numbers using ports

1361. Most vessels associated with construction of the Project will spend most of the time in the Offshore Project Area (i.e. in the OAA in which the turbines and other infrastructure will be constructed, or the ECC). During construction, certain vessels will remain offshore for the entire season without entering any port and will therefore require regular servicing by offshore supply vessels. Other vessels will make regular port calls.

1362. The most recent 2019 data for AIS vessels passing through the ports of Dundee and Leith was compared with the maximum number of vessel transits estimated at these ports for each year associated with construction of the Project (**Table 6-160**). The ports of Dundee and Leith only have the capacity to be used for WTG storage, marshalling and assemblage and not for handling foundations. Therefore the maximum number of vessel transits to/from these ports is 382 transits with the remaining vessels associated with transportation of foundations, using other construction ports, such as Port of Nigg.

1363. For both the port of Dundee and Leith, it is important to note that the number of vessel transits recorded in 2019 were due to other offshore wind farm construction activity (Seagreen and Neart na Gaoithe OWFs). As construction of the Project will not overlap with other offshore wind farm construction timeframes, the estimated 382 transits to/from these ports will replace construction vessel traffic from other offshore wind farm developments rather than add to the total number of transits recorded in 2019. Therefore, it is anticipated that there will be no substantial increase in vessel activity at the Ports of Leith and Dundee, above that recorded in 2019. Furthermore, the ports have limited capacity and so multiple OWFs would not be able to use the ports concurrently. Consequently, in-combination impacts arising from vessel transits will be very similar to Project alone impacts.

Table 6-160. Estimated numbers of vessels arriving or departing from the ports of Dundee and Leith in 2019, based on AIS data, plus estimated number of transits by vessels associated with the Project. The estimated maximum number of transits per year for Project vessels represents a worst case scenario.

Port	Vessel tracks (single journeys) crossing into harbour area	
	2019 AIS vessel track total count	Estimated maximum transits per year for construction of the Project
Dundee	2,362	382
Leith	1,572	382

6.3.23.5.2 Indicative vessel transit routes

1364. **Figure 6-35** shows vessel density within the Outer Firth of Forth and St Andrews Bay Complex SPA and outside of the site in 2019. The main shipping lanes from Leith and Dundee can be seen. **Figure 6-35** also gives an indication of which transit routes construction vessels associated with the Project (if Leith or Dundee are used for construction) might take through the SPA, under the assumption that vessels will be subject to the same navigational safety constraints as construction vessels associated with Seagreen and Neart na Gaoithe OWFs.

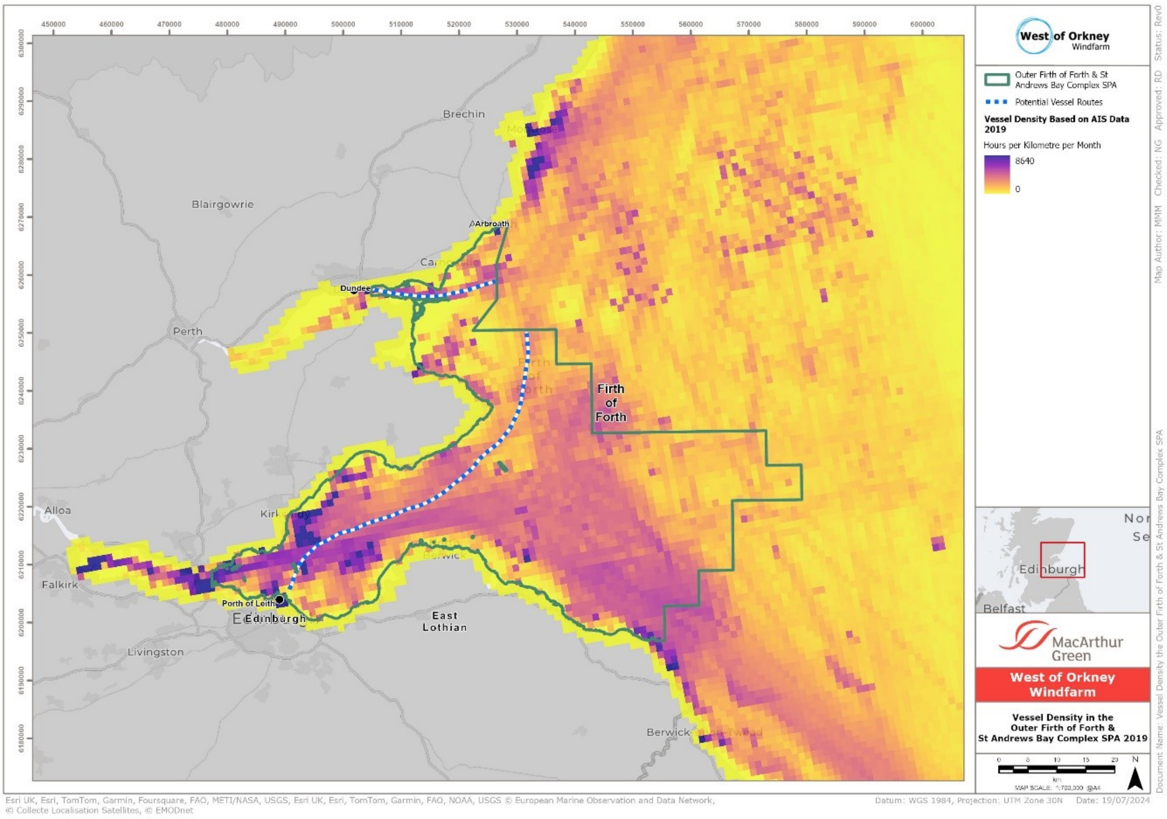


Figure 6-35. Vessel density in the Outer Firth of Forth and St Andrews Bay Complex SPA in 2019 with potential vessel routes that would be used by Project vessels indicated.

6.3.23.5.3 An estimate of the percentage of the SPA populations that are likely to be impacted and the extent of the SPA impacted

1365. Vessel routes are not known at this stage. However, NatureScot requested (consultation meeting, 2 July 2024) that an estimate of the percentage of the SPA populations that are likely to be impacted and the extent of the SPA impacted was provided in this assessment. Vessels associated with the Project, that could use the ports of Dundee or Leith, would use established shipping lanes. These ports have been used for storage and marshalling for several OWF projects that have been constructed, including Seagreen and Neart na Gaoithe. As construction of these projects will be completed prior to West of Orkney Windfarm construction starting, there will be no net increase in the volume of vessels using the shipping lanes, nor any increase in the spatial extent of any disturbance caused by vessels associated with the Project. However, an estimate of the percentage of the marine SPA that could be impacted by vessels from the ports of Dundee or Leith was calculated, as requested by NatureScot.

1366. Evidence reviewed by Goodship and Furness (2022) suggests that most waterbirds have a flushing distance of <1 km. Consequently, a buffer of 1 km either side of the vessel track was applied to represent the area in which birds could potentially be disturbed and possibly displaced by the presence of a vessel on transit. A second highly precautionary scenario was considered, using the 2 km buffer that is advised by NatureScot for OWFs, i.e. assuming a buffer of 2 km either side of the vessel track.

1367. For vessels leaving the port of Dundee and heading towards the Project (**Figure 6-35**), the initial 22.2 km of the indicative vessel route would be within the Outer Firth of Forth and St Andrews Bay Complex SPA. Assuming a 1 km buffer either side of the vessel track (i.e. a total disturbance area of 2 km wide by 22.2 km long, excluding any part of the area covered by land) gives an area of 44.4 km^2. Assuming a 2 km buffer either side of the vessel track (i.e. a total disturbance area of 4 km wide by 22.2 km long, excluding any part of the area covered by land) gives an area of 88.8 km^2. The Outer Firth of Forth and St Andrews Bay Complex SPA has an area of 2720.5 km^2. This means that under the two scenarios, disturbance of birds could happen over an area of 1.6 % or 3.3 % of the SPA, under the assumption of disturbance up to 1 km or 2 km from the vessel track, respectively.

1368. For vessels leaving the port of Leith and heading towards the Project (**Figure 6-35**), the initial 67.1 km of the vessel route would be within the Outer Firth of Forth and St Andrews Bay Complex SPA. Assuming a 1 km buffer either side of the vessel track (i.e. a total disturbance area of 2 km wide by 67.1 km long) gives an area of 134.2 km^2. Assuming a 2 km buffer either side of the vessel track (i.e. a total disturbance area of 4 km wide by 67.1 km long) gives an area of 268.4 km^2. The Outer Firth of Forth and St Andrews Bay Complex SPA has an area of 2720.5 km^2. This means that under the two scenarios, disturbance of birds could happen over an area of 4.9 % or 9.9 % of the SPA, under the assumption of disturbance up to 1 km or 2 km from the vessel track, respectively.

1369. This information does not however take into account the distribution of birds through the SPA. The distribution of birds across the Outer Firth of Forth and St Andrews Bay Complex SPA is discussed in detail below and the potential for vessel disturbance to impact the site's conservation objectives is considered.

1370. The information also does not take into account the short-term nature of any disturbance caused by a vessel on transit between the Project and the port. Vessels passing through will only be present in an area for a short period of time, after which any disturbed birds can return to their behaviours they were undertaking prior to the disturbance. There may be a delay before birds return to the same area or behaviour, depending on the species' sensitivity to disturbance and also individual variation in response to presence of a vessel. However, the whole transit route will not be subject to disturbance at the same time and so the proportion of the SPA potentially affected by vessels at any one point in time, will be substantially smaller than the estimate provided above.

6.3.23.5.4 In-combination impacts with any other proposed developments within the Project timeframe

1371. The ports of Leith and Dundee have been used for construction by Seagreen and Neart na Gaoithe and are very likely to be used by other ScotWind and InTOG OWFs which are currently in the planning process. Additionally, Berwick Bank Wind Farm, if consented, will lay an export cable through the SPA. Consequently, there is therefore potential for an increase in the volume of construction-related vessel traffic passing through the Outer Firth of Forth and St Andrews Bay Complex SPA. However, construction of OWFs and cable laying will not occur at the same point in time for multiple OWFs and instead will be sequential. Consequently, it is likely that there will be no net increase in OWF-related vessel traffic transiting through the SPA. This is illustrated by Seagreen and Neart na Gaoithe using the port of Dundee for construction but as these projects are either fully operational or close to being operational, construction vessel traffic associated with these projects will have decreased by the time the Project begins construction.

6.3.23.6 *Assessment of predicted impacts alone and in-combination*

1372. In a consultation meeting (24 June 2024), NatureScot advised that, "it would be helpful to include information on bird distributions within Scapa Flow, identifying areas of high densities of species susceptible to disturbance by vessels (i.e. divers and seaduck)". As the Outer Firth of Forth and St Andrews Bay Complex SPA has been screened in for the same impact pathways as the Scapa Flow SPA, information on the distribution of qualifying diver, grebe and seaduck features of the Outer Firth of Forth and St Andrews Bay Complex SPA is presented below in the assessment sections for each species. For all wintering features, a map of their distribution is provided, using data downloaded from Marine Directorate's NMPi mapping tool. For all species except Slavonian grebe and common goldeneye, data illustrated on the maps was recorded between 2001 to 2005. Non-breeding Slavonian grebe and common goldeneye count data was recorded between 2006 to 2011.

1373. Divers and seaduck are known to be particularly sensitive to vessel movements (Furness *et al*. 2013; Bradbury *et al*. 2014; Goodship & Furness, 2022). Whilst vessel movements within the SPA might cause disturbance and displacement of other qualifying features of the SPA, these are species known to be less sensitive to the presence of vessels and disturbance is very unlikely. Therefore, the site's conservation objectives for seabirds are very unlikely to be undermined by activity of vessels associated with construction or decommissioning of the Project. Consequently, no adverse effect on site integrity was concluded for seabird features of this SPA, under this impact pathway.

6.3.23.6.1 Red-throated diver

1374. Red-throated diver have a very high sensitivity to boat disturbance (Furness *et al*. 2013). Red-throated divers avoid shipping lanes and will fly away from approaching vessels at a distance of >1km (S. O'Brien, *pers. obs.*, Schwemmer *et al.* 2011). Burger *et al.* (2019) found red-throated divers in the German Bight to be more abundant in areas of no or little ship traffic and found a strong negative effect of ship speed on the rate at which divers returned to areas after being flushed by a vessel. Burger *et al.* (2019) recommended restricting vessels to shipping lanes and applying speed limits to vessels to reduce the extent of disturbance. Mendel *et al.* (2019) also reported red-throated divers changing their distribution due to ship traffic and OWFs. Goodship and Furness (2022) recommended a breeding season buffer zone of up to 75 0m and a non-breeding season buffer zone of up to 1 km for this species.

1375. The Outer Firth of Forth and St Andrews Bay Complex SPA red-throated diver non-breeding population size at citation was 851 individuals, representing 5.0% of the GB population. This species occurs in the SPA in significant numbers from mid-September to late March, although low numbers can be present year-round. Red-throated divers undergo a post breeding flightless moult during September to December.

1376. Red-throated diver distribution (**Figure 6-36**) is concentrated in the St Andrews Bay part of the SPA and off the Fife coast. Red-throated divers tend to be found in shallow coastal waters.

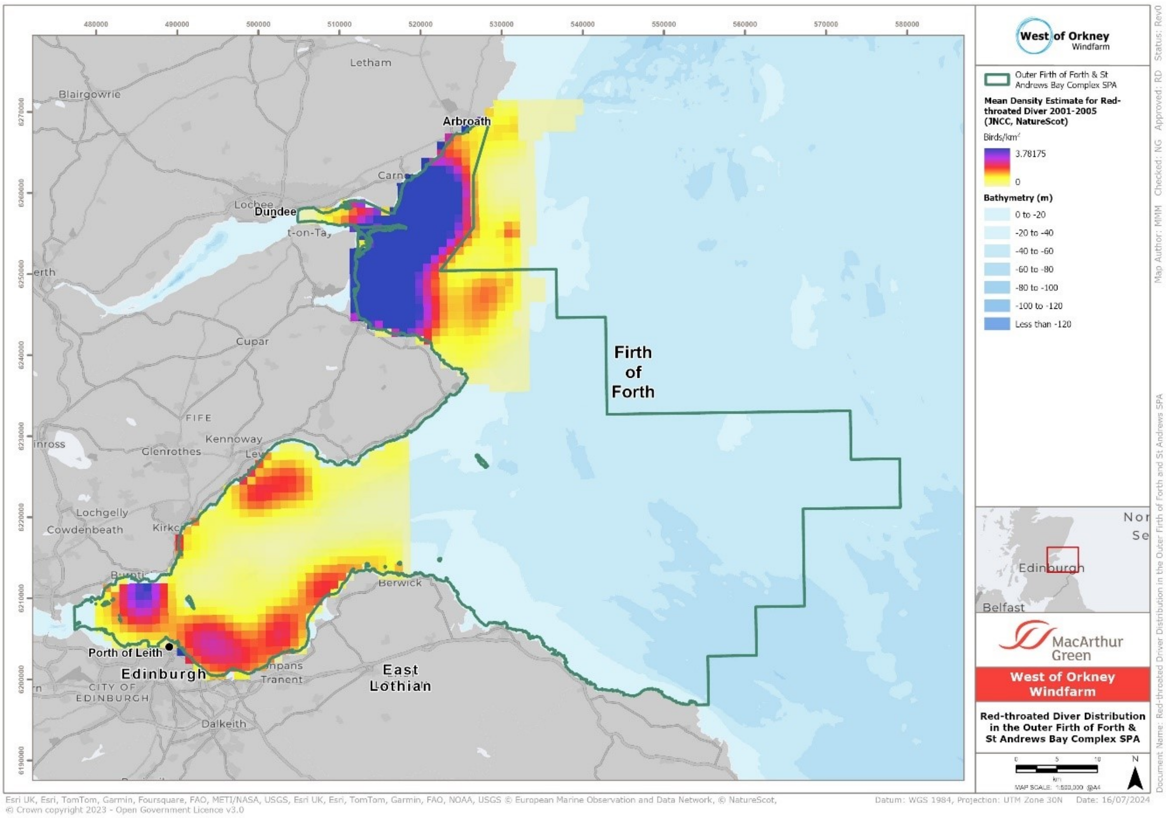


Figure 6-36. Red-throated diver distribution in the Outer Firth of Forth and St Andrews Bay area from surveys recorded during the non-breeding seasons between 2001 to 2005. Data downloaded from the Marine Directorate's NMPi mapping tool.

1377. Vessel transit routes from Dundee may pass through an area of high-density of red-throated divers off the Fife coast but vessels would be following existing shipping lanes, which divers typically do not use (Schwemmer *et al*. 2011). Red-throated divers occur at lower density in the Firth of Forth part of the site where their distribution does not overlap with the main shipping lanes.

1378. Any disturbance/displacement effect that does occur will be short-term, both as a vessel passes through an area, after which birds would return to the area, and for the duration of the Project construction period, after which the feature would be expected to return to baseline conditions. The Outer Firth of Forth and St Andrews Bay Complex SPA Conservation and Management Advice notes that:

- 'Significant disturbance' should be interpreted to mean disturbance that affects the integrity of the site through alteration of the distribution of the qualifying features such that recovery cannot be expected or effects can be considered long term.

1379. Any displacement effects that do occur would not cause significant disturbance, as defined above. Therefore, a conclusion is reached of no adverse effect on site integrity for this feature.

6.3.23.6.2 Slavonian grebe

1380. Slavonian grebe has a very high sensitivity to boat disturbance (Goodship & Furness, 2022). Slavonian grebes can be absent from areas where regular marine activity takes place. However, Slavonian grebes appear to habituate to regular presence of vessels, occurring in areas with frequent ferry and fishing vessel traffic in Orkney (Jackson, 2018).

1381. The Outer Firth of Forth and St Andrews Bay Complex SPA Slavonian grebe non-breeding population size at citation was 30 individuals, representing 2.7% of the GB population. This species is present in the SPA from mid-September to April.

1382. Slavonian grebes only occur in shallow waters close inshore. **Figure 6-37** shows them only in the Firth of Forth. However, the Outer Firth of Forth and St Andrews Bay Complex SPA Conservation and Management Advice notes that Slavonian grebes also occur in the Firth of Tay, but notes they are more abundant in the Forth.

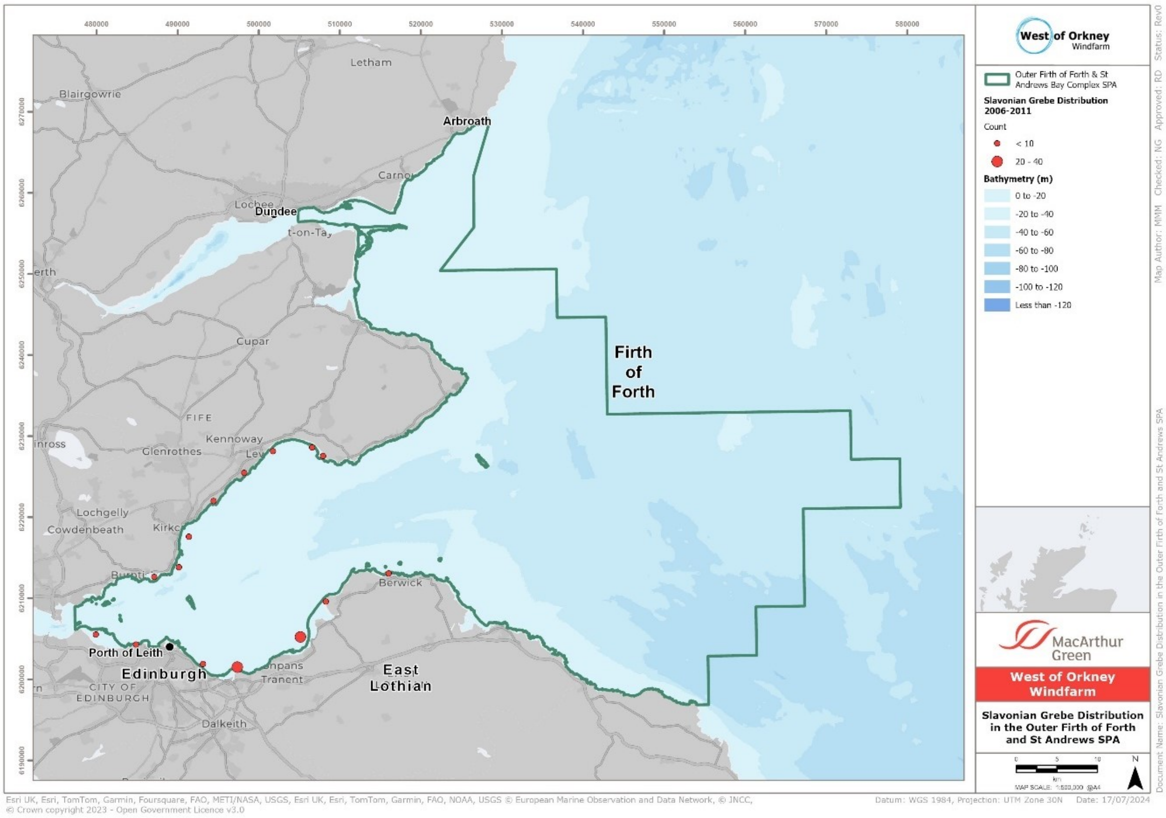


Figure 6-37. Slavonian grebe distribution in the Outer Firth of Forth and St Andrews Bay area from surveys recorded during the non-breeding seasons between 2006 to 2011. Data downloaded from the Marine Directorate's NMPi mapping tool.

1383. As Slavonian grebes occur only close inshore in the Firth of Forth and Firth of Tay, their distribution does not overlap with vessel transit routes from Dundee or Leith. Vessels associated with the Project would be highly unlikely to cause disturbance/displacement to this species. Consequently, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.23.6.3 Common eider

1384. Common eiders have a medium to high sensitivity to human disturbance (Goodship & Furness, 2022). Eiders can be disturbed by boats that are moving quickly through foraging, roosting and moulting areas (Goodship & Furness, 2022). Eider foraging activity has been demonstrated to be reduced by boat disturbance (Merkel *et al.* 2009). Goodship & Furness (2022) recommended a buffer zone of up to 500 m for eiders in the non-breeding season to protect roosting and foraging birds from disturbance from watercraft.

1385. The Outer Firth of Forth and St Andrews Bay Complex SPA common eider non-breeding population size at citation was 21,546 individuals, representing 35.9% of the GB population. Eiders are present throughout the year in the Outer Firth of Forth and St Andrews Bay Complex SPA. Their non-breeding season is September to mid-April with a flightless moult period from July to mid-September.

1386. Common eider distribution (**Figure 6-38**) is concentrated in the St Andrews Bay and Tay Estuary part of the SPA. The highest densities of eider were in the Firth of Tay and along the north coast of the Firth of Forth. They have a preference for shallow sheltered bays for foraging, moulting and roosting, and therefore tend to occur close inshore.

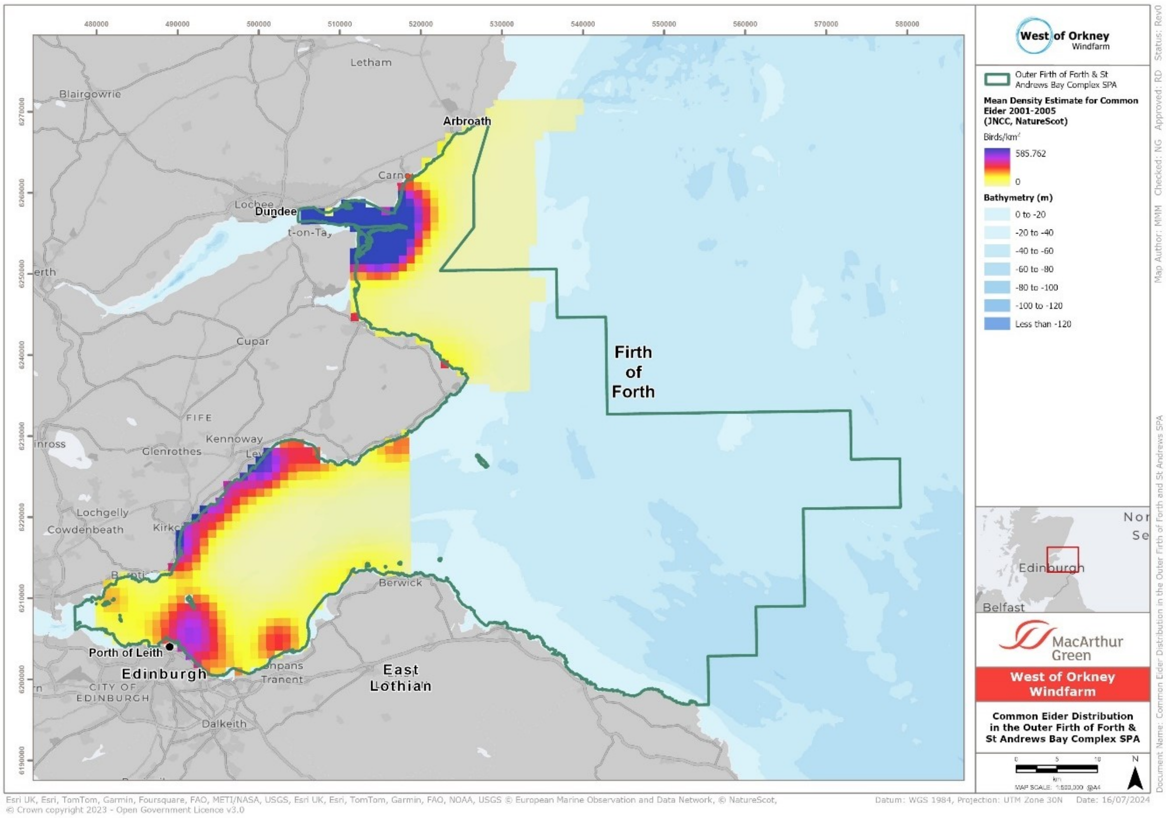


Figure 6-38 Common eider distribution in the Outer Firth of Forth and St Andrews Bay area from surveys recorded during the non-breeding seasons between 2001 to 2005. Data downloaded from the Marine Directorate's NMPi mapping tool.

1387. Vessel transit routes from Dundee and Leith would pass through an area of high-density of common eiders in the Tay Estuary but vessels would be following existing shipping lanes, which this species typically do not use, preferring shallow inshore areas due to being a benthic-feeding species. In the Firth of Forth, common eider densities were highest close inshore, with only very low densities of eider in the middle of the Forth where the main shipping lanes are. There is therefore low potential for vessels to cause disturbance/displacement of this feature. Consequently, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.23.6.4 Long-tailed duck

1388. Long-tailed duck have a moderate sensitivity to boat disturbance, with Bradbury et al. (2014) giving this species a score of 3 for disturbance susceptibility (on a scale of 1 to 5). Jackson (2018), while counting long-tailed ducks from a vessel in Scapa Flow, noted birds flying off while being counted, with them alighting a few hundred metres away or flying further, suggesting a higher sensitivity to the presence of vessels.

1389. The Outer Firth of Forth and St Andrews Bay Complex SPA long-tailed duck non-breeding population size at citation was 1,948 individuals, representing 17.7% of the GB population. This species is present in the site from mid-September to late April. Whilst this species undergoes a flightless moult, it is not thought to occur while the birds are wintering in Scottish waters.

1390. Long-tailed duck distribution (**Figure 6-39**) is concentrated in the Firth of Tay part of the Outer Firth of Forth and St Andrews Bay Complex SPA but are also present in northern and central sections of the Firth of Forth. Unlike most other seaducks and grebes, long-tailed duck prefer open water and can be found far offshore, as well as in sheltered coastal waters and bays.

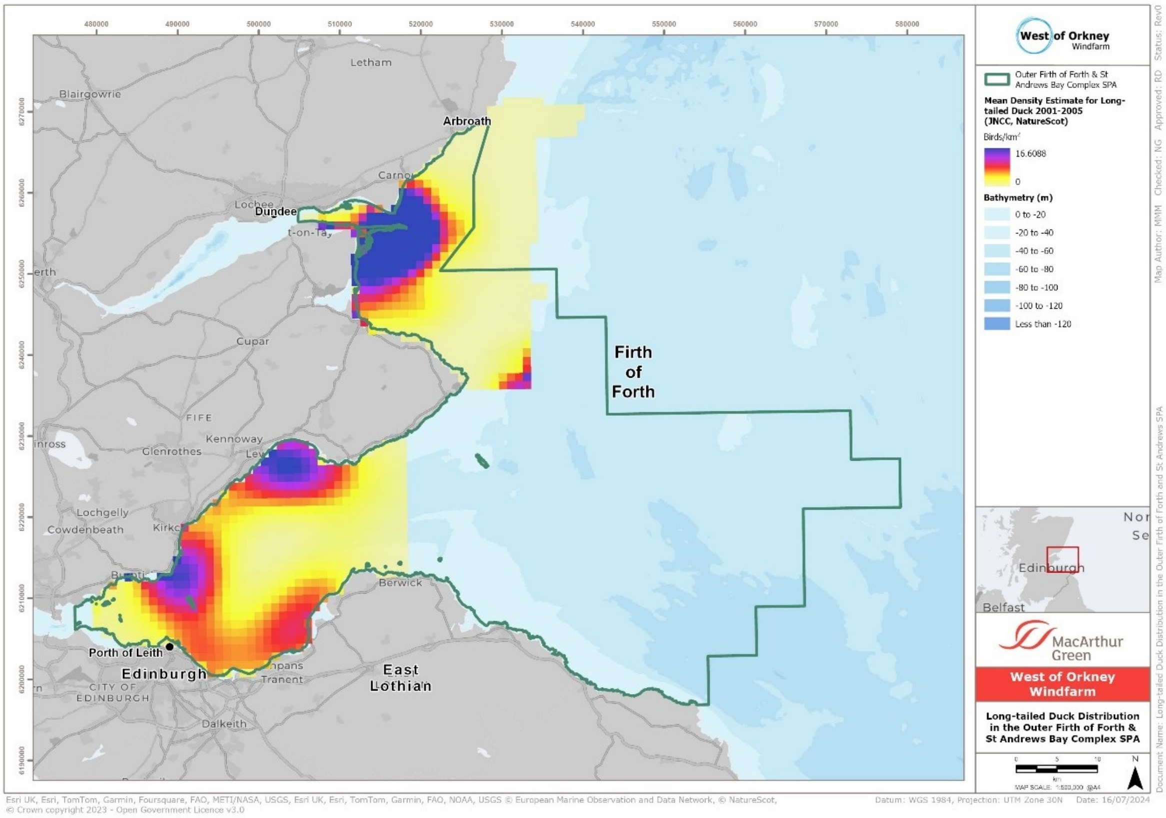


Figure 6-39. Long-tailed duck distribution in the Outer Firth of Forth and St Andrews Bay area from surveys recorded during the non-breeding seasons between 2001 to 2005. Data downloaded from the Marine Directorate's NMPi mapping tool.

1391. The long-tailed duck distribution indicates that vessel transit routes from Dundee would pass through an area of high-density of long-tailed duck. However, it is unlikely that the seaduck are using the deeper waters of existing shipping routes that would be used by vessels associated with the Project. It is much more likely that the long-tailed ducks are closer to the shore, away from the shipping lanes.

1392. Given the more offshore distribution of this species and the high-density aggregation in the Firth of Tay, there is more potential for vessels associated with the Project to cause disturbance to this species, than for most other diver, grebe and seaduck features of the SPA. However, this species has a moderate sensitivity to shipping and vessels would be using established shipping routes that have been used by vessels constructing Seagreen and Neart na Gaoithe OWFs, as well as other vessels using the ports. As these OWFs are now largely constructed, the vessel traffic associated with these projects will be decreasing or absent by the time West of Orkney Windfarm may use these port facilities. Therefore, there will not be a substantial increase in vessel traffic associated with the West of Orkney Windfarm that would cause a significant increase in disturbance to long-tailed ducks.

1393. Any displacement effect that does occur will be short-term, both as a vessel passes through an area, after which birds would return to the area, and for the duration of the Project construction period, after which the feature would be expected to return to baseline conditions. The Outer Firth of Forth and St Andrews Bay Complex SPA Conservation and Management Advice notes that:

- 'Significant disturbance' should be interpreted to mean disturbance that affects the integrity of the site through alteration of the distribution of the qualifying features such that recovery cannot be expected or effects can be considered long term.

1394. Any displacement effects that do occur would not cause significant disturbance, as defined above. Therefore, a conclusion is reached of no adverse effect on site integrity for this species.

6.3.23.6.5 Common scoter

1395. Common scoter is highly sensitive to the presence of vessels and may flush from boats that are >3km away (Schwemmer *et al.* 2011). Goodship & Furness (2022) classified common scoter as having a high sensitivity to disturbance.

1396. The Outer Firth of Forth and St Andrews Bay Complex SPA common scoter non-breeding population size at citation was 4,677 individuals, representing 4.7% of the GB population. Common scoters are present in the SPA from July to April, with a flightless moult period from July to October.

1397. Common scoter distribution (**Figure 6-40**) is concentrated in the St Andrews Bay part of the SPA, including along the Fife coastline. There are also concentrations along the south coast of the Firth of Forth. Scoters tend to be found in water with a depth of 20m or less, due to being benthic-feeders.

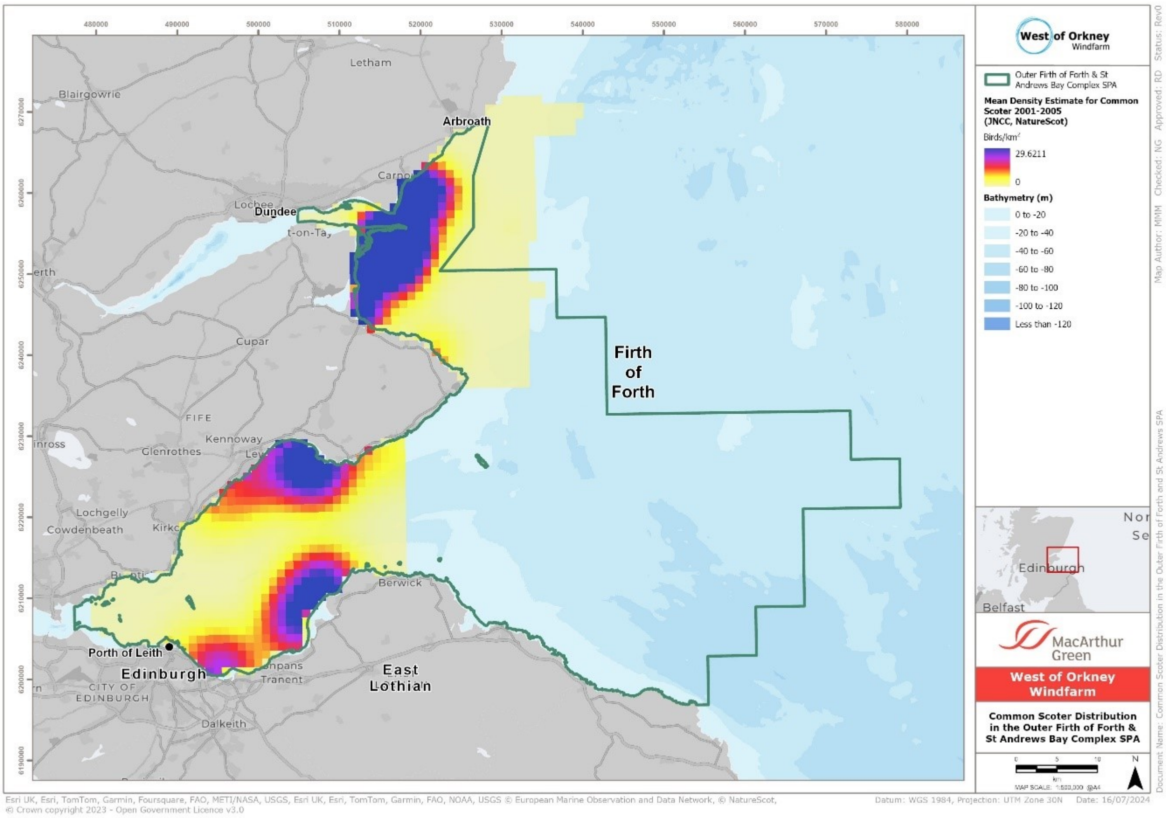


Figure 6-40. Common scoter distribution in the Outer Firth of Forth and St Andrews Bay area from surveys recorded during the non-breeding seasons between 2001 to 2005. Data downloaded from the Marine Directorate's NMPi mapping tool.

1398. Vessel transit routes from Dundee would pass through an area of high-density of common scoters but vessels would be following existing shipping lanes, which this species typically do not use, preferring shallow inshore areas. In the Firth of Forth, common scoter densities were highest close inshore, with very lowest densities in the middle of the Forth where the main shipping lanes lie.

1399. Despite the high sensitivity of this species to the presence of vessels, shipping associated with the Project is unlikely to disturb common scoter in the Outer Firth of Forth and St Andrews Bay Complex SPA due to the inshore distribution and relatively low density of this feature in areas where vessels might transit. Given this, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.23.6.6 Velvet scoter

1400. The Outer Firth of Forth and St Andrews Bay Complex SPA is one of the most important sites for wintering velvet scoter in Britain, supporting 30% of the GB population.

1401. The susceptibility of velvet scoter to disturbance was not assessed by Goodship & Furness (2022). However, Bradbury *et al.* (2014) classed velvet scoter as having a high sensitivity to disturbance (score of 5 out of 5), which was the same as common scoter.

1402. The Outer Firth of Forth and St Andrews Bay Complex SPA velvet scoter non-breeding population size at citation was 755 individuals, representing 31% of the GB population. Velvet scoters are present in the SPA between September and mid-April, with a flightless moult period from July to October.

1403. Velvet scoters occur in the highest densities in the Firth of Forth and St Andrews Bay Complex SPA in the Firth of Tay (**Figure 6-41**) but they also occur along the north and south shores of the Firth of Forth.

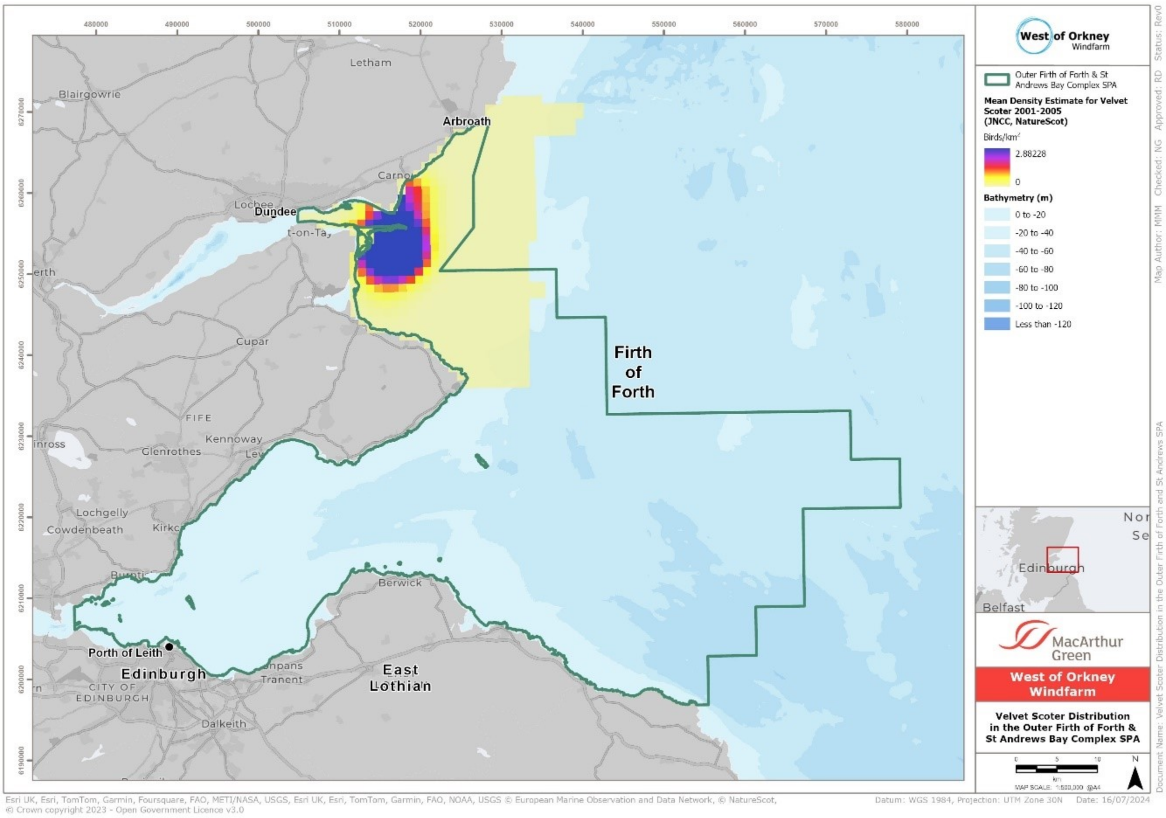


Figure 6-41. Velvet scoter distribution in the Outer Firth of Forth and St Andrews Bay area from surveys recorded during the non-breeding seasons between 2001 to 2005. Data downloaded from the Marine Directorate's NMPi mapping tool.

1404. Velvet scoter distribution in the Firth of Forth tends to occur close inshore. Vessel transit routes from Dundee (**Figure 6-41**) would pass through a high-density aggregation of velvet scoter but vessels would be following existing shipping lanes that avoid the more shallow areas used by velvet scoter.

1405. Despite the high sensitivity of this species to vessels and the importance of this site for this species, vessels associated with the Project will not transit through areas used by this species. Consequently, a conclusion of no adverse effect on site integrity for this qualifying feature is reached.

6.3.23.6.7 Common goldeneye

1406. Goodship and Furness (2022) reported goldeneye as having a high sensitivity to disturbance, recommending a buffer zone of up to 800 m in the non-breeding season. Jarrett *et al.* (2018)

noted that, in Orkney, goldeneye rarely come into contact with marine activity due to their preference for very sheltered areas.

1407. The Outer Firth of Forth and St Andrews Bay Complex SPA common goldeneye non-breeding population size at citation was 589 individuals, representing 2.9% of the GB population. This species is present in the site from September to mid-April, with a post-breeding flightless moult from mid-July to October. Common goldeneye distribution (**Figure 6-42**) is concentrated in the Firth of Forth part of the SPA. This species occurs only close inshore, in the shallow waters of the Firth of Forth coastlines.

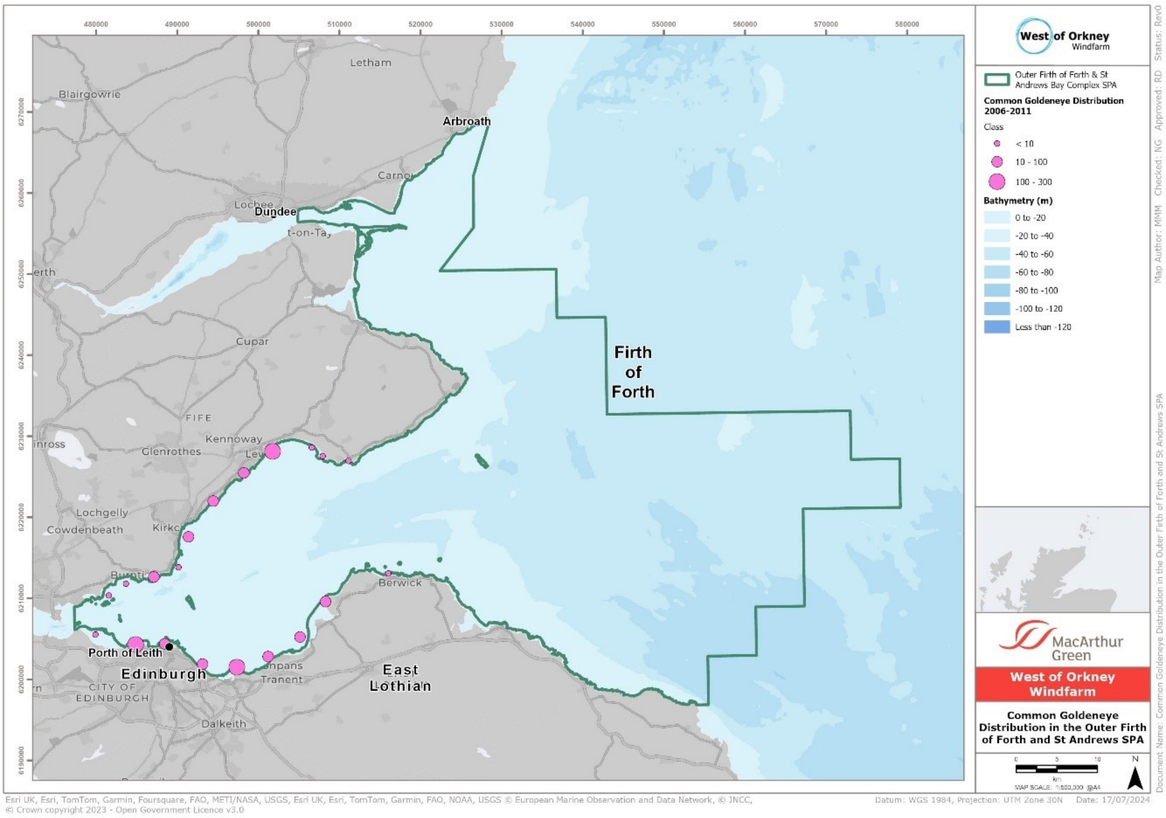


Figure 6-42. Common goldeneye distribution in the Outer Firth of Forth and St Andrews Bay area from surveys recorded during the non-breeding seasons between 2006 to 2011. Data downloaded from the Marine Directorate's NMPi mapping tool.

1408. Goldeneye have an inshore distribution, occurring along both the north and south shores of the Firth of Forth (**Figure 6-42**). Vessels using the ports of Dundee or Leith would be highly unlikely to cause disturbance to goldeneye as vessels will be using deeper water channels further offshore. Given this, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.23.6.8 Red-breasted merganser

1409. Red-breasted merganser have a moderate sensitivity to boat disturbance, with Bradbury *et al*. (2014) giving this species a score of 3 for disturbance susceptibility (on a scale of 1 to 5). However, Mendel *et al*. (2008) and Jarrett *et al*. (2018) noted the sensitivity of red-breasted mergansers to vessel movements.

1410. The Outer Firth of Forth and St Andrews Bay Complex SPA red-breasted merganser non-breeding population size at citation was 431 individuals, representing 5.1% of the GB population. This species is present in the SPA throughout the year, with a non-breeding season from mid-August to late March. A flightless moult period lasts from mid-July to September.

1411. Red-breasted merganser distribution (**Figure 6-43**) is concentrated in the St Andrews Bay and Firth of Tay part of the SPA, as well as being widespread along the Firth of Forth coastline. This species tends to only occur within 2km of land, with a preference for shallow water, although they may roost further offshore.

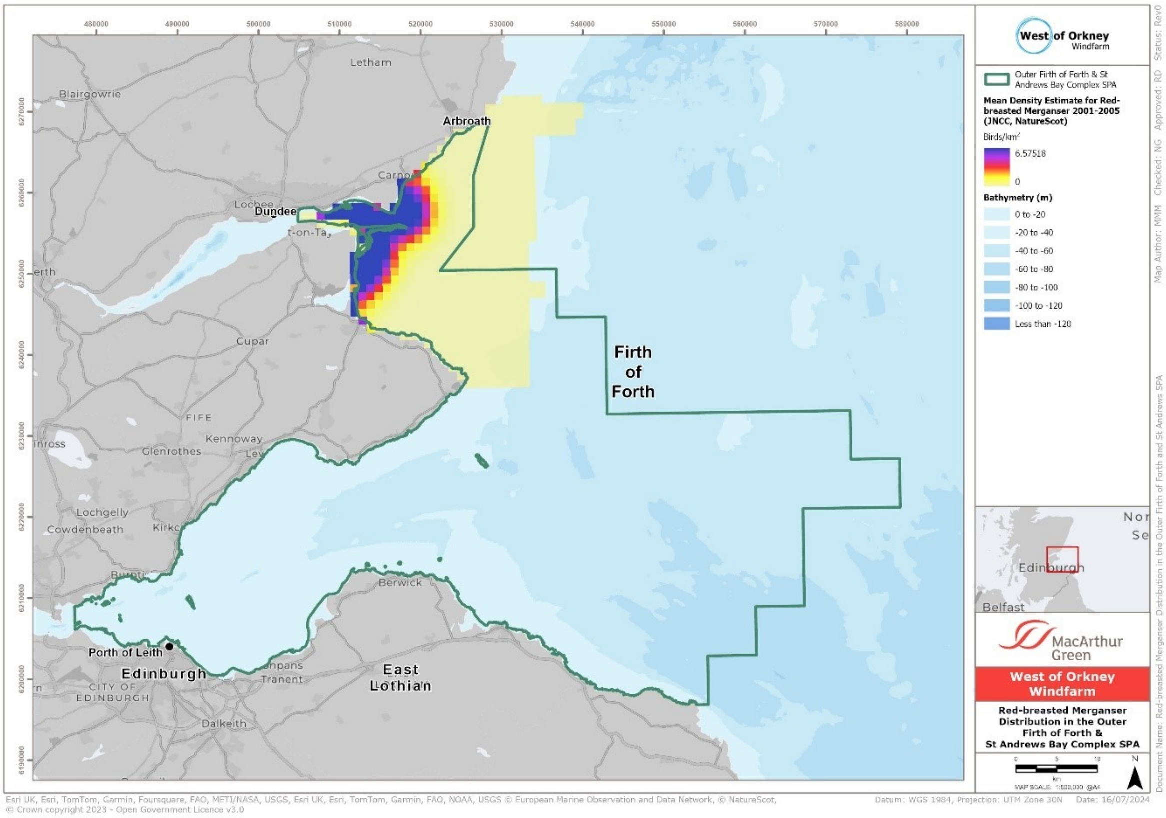


Figure 6-43. Red-breasted merganser distribution in the Outer Firth of Forth and St Andrews Bay area from surveys recorded during the non-breeding seasons between 2001 to 2005. Data downloaded from the Marine Directorate's NMPi mapping tool.

1412. Vessel transit routes from Dundee would pass through an area of high-density of red-breasted merganser but vessels would be following existing shipping lanes, which this species typically do not use, preferring shallow inshore areas. The distribution of red-breasted merganser does not overlap with the main shipping routes from the port of Leith.

1413. Given the preference for this species for areas within 2km of the coast, it is unlikely that vessels following existing routes would pass close to aggregations of red-breasted merganser and it is highly unlikely that vessels associated with the Project would cause disturbance to this species. Consequently, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.23.7 Conclusions

1414. Generally, vessel transit routes from the Port of Leith overlap little with divers and seaduck components of the wintering waterfowl assemblage feature of the Outer Firth of Forth and St Andrews Bay Complex SPA. Many of the wintering waterfowl species had a high-density aggregation in St Andrews Bay. At the coarse scale of the map, it appears that the shipping lanes for the port of Dundee pass through the middle of this aggregation and could therefore cause disturbance/displacement. However, as this is an existing shipping lane, seaducks will have already habituated to the presence of vessels and divers will not occur in high densities in the shipping lane (Schwemmer *et al*. 2011).

1415. The species most sensitive to the presence of vessels (red-throated diver, common scoter) may experience temporary disturbance due to a vessels transiting through the area. However, this will be short term in nature, both as a vessel passes through an area and as the period of construction activities, requiring increased numbers of vessels, will be of short duration. The site's Conservation and Management Advice states that: "*Significant disturbance' should be interpreted to mean disturbance that affects the integrity of the site through alteration of the distribution of the qualifying features such that recovery cannot be expected or effects can be considered long term. It is expected that significant disturbance will lead to more than a transient effect on the distribution of the qualifying features*." Construction vessels transiting through the Outer Firth of Forth and St Andrews Bay Complex SPA will not cause long term significant disturbance to the qualifying features of the site.

1416. Therefore, a conclusion of **no adverse effect on site integrity** is reached for all qualifying features of the **Outer Firth of Forth and St Andrews Bay Complex SPA** from both **Project alone** and **in-combination** potential vessel impacts. However, noting the possible overlap with some wintering waterbird distributions with vessel transit routes and the high sensitivity of some species to vessels, further consideration is given to minimising the possibility of disturbance/displacement to those qualifying features, by vessels associated with the Project.

6.3.23.8 Potential mitigation measures

1417. The site's Conservation and Management Advice[52] advises that for 'boat use associated with both commercial and recreational activities', for diver and seaduck qualifying features and/or named components of the wintering waterbird assemblage feature, the following should be undertaken to support site management:

- Reduce or limit pressures (disturbance) associated with boat use during commercial and recreational activities through effective mitigation such as:
- following the Scottish Marine Wildlife Watching Code (SMWWC);
- seasonal restrictions to avoid sensitive time periods for those protected features most susceptible to disturbance; and/or

[52] SiteLink - Outer Firth of Forth and St Andrews Bay Complex SPA (nature.scot)

- production of vessel management plans associated with activities that require a marine licence. This may include agreed routes and for boats, potential seasonal speed restrictions.

1418. An outline Navigational Safety and Vessel Management Plan was submitted with the West of Orkney Windfarm application[53]. This will be further developed post-consent, once there is certainty over which ports/harbours will be used during construction. Vessels will be required to adhere to the Vessel Management Plan, including adhering to embedded mitigation measures and to follow existing shipping routes where possible.

1419. The following mitigation measures are proposed to ensure no adverse effect on site integrity:

- Project vessels will limit their speed while transiting through the SPA to 10 kts; and
- Pre construction / mobilisation briefings will be used to highlight bird sensitivity to vessel movements and the mitigations required in order to minimise potential impacts to birds in marine SPAs;
- The vessel crew will watch for aggregations of seabirds on the water and, if aggregations are seen, will alter the vessel's Master. Where necessary and having regard to maritime safety, the vessel's course and/or speed will be adjusted to avoid aggregations of birds.

1420. Limiting a vessel's speed will reduce disturbance as marine birds have been shown to be less likely to be displaced by slower moving vessels. It will also reduce engine noise, which can also disturb birds. Avoiding aggregations of birds on the water will also reduce disturbance, although the most sensitive species, such as great northern diver, may react to the presence of the vessel before they are readily visible to the crew.

[53] omp4 - outline_navigation_and_safety_and_vessel_management_plan.pdf (marine.gov.scot)

6.3.24 Rousay SPA

6.3.24.1 Site Description

1421. The Rousay SPA was classified on 2 February 2000, with marine extension classified on 25 September 2009, due to its populations of breeding seabirds. The site is approximately 50 km east of the Project.

1422. Rousay is an island off the north-east coast of Mainland, Orkney. The SPA consists of sea cliffs and areas of maritime heath and grassland in the northwest and north-east of the island.

1423. The boundary of the Special Protection Area overlaps with the boundary of Rousay SSSI, and the seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface.

6.3.24.2 Conservation Objectives for the SPA

1424. The conservation objectives of Rousay SPA are to:

- 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
- 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.

6.3.24.3 Qualifying features

1425. The qualifying features of the SPA are presented below in **Table 6-161**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

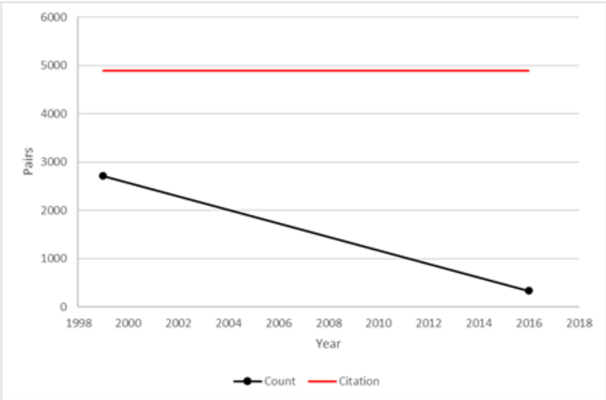
Table 6-161. Qualifying interests and condition for the Rousay SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake*	4,900 pairs; 1% of the GB population	330 pairs	Unfavourable Declining	24 June 2016	Red
Arctic tern	average of 790 pairs in the five year period between 1991 and 1995; 2% of the GB population	9 pairs	Unfavourable Declining	1 June 2021	Amber

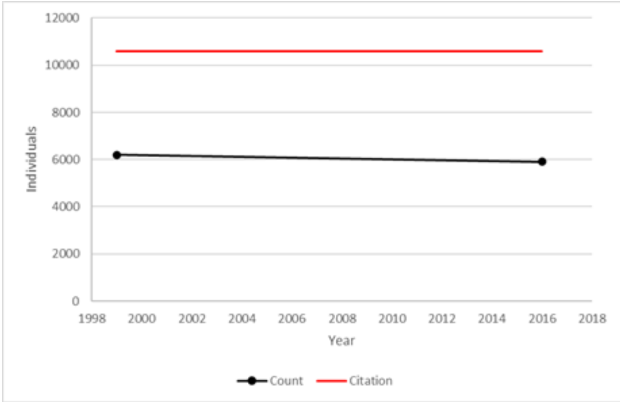
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Arctic skua*	130 pairs; 4% of the GB population	27 pairs	Unfavourable Declining	1 June 2021	Red
Guillemot*	10,600 individuals, 1% of the GB population	5,911 individuals	Unfavourable No change	1 June 2021	Amber
Fulmar*	1,240 pairs, 0.2% of GB population	2,192 pairs	Favourable Maintained	1 June 2021	Amber
Seabird assemblage	regularly supports about 30,000 seabirds including nationally important populations	n/a	Unfavourable Declining	24 June 2016	n/a

1426. Rousay SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 30,000 seabirds including nationally important populations of the following species: black-legged kittiwake, Arctic tern, Arctic skua, Northern fulmar and common guillemot.

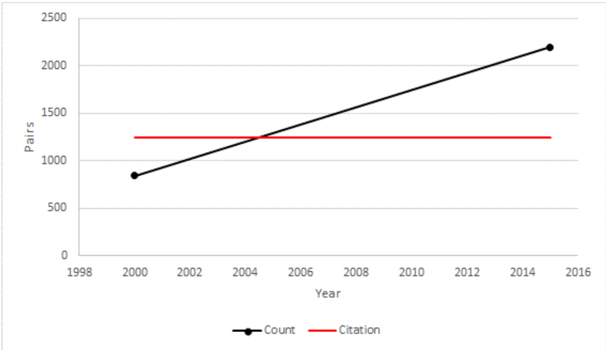
1427. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) count data was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-44**).



Kittiwake



Guillemot



Fulmar

Figure 6-44 Rousay SPA qualifying feature population trends from 1981 - 2022 (citation population size shown by red line).

6.3.24.4 *Potential for the Project to impact the site's conservation objectives*

1428. The Rousay SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **guillemot** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

1429. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway.

Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

1430. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

1431. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.24.5 *Assessment of predicted impacts for Project alone and in-combination*

1432. in-combination assessment was undertaken that collated quantitative information on impacts to features of this SPA from published consent applications. Note that no other OWFs have been required to undertake a quantitative assessment of fulmar displacement/barrier impacts and so an in-combination assessment was not possible for this species. This was discussed and agreed with NatureScot (consultation meeting, 11 June 2024).

1433. Other reasonably foreseeable projects which have not yet submitted an application may also impact some of the qualifying features of this site. MD-LOT advised (by email, 10 June 2024) that a qualitative assessment of OWF projects for which a Scoping Opinion has been adopted should be undertaken.

1434. OWF projects for which a Scoping Opinion has been adopted and which identified possible impacts from their project on the Rousay SPA, in their Scoping Reports, are listed in **Table 6-162**.

Table 6-162 In-combination project with the potential to impact the Rousay SPA that have not yet submitted an application. Only features which could be impacted by Project impacts are listed

SPA qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Black-legged kittiwake						Y
Common guillemot						Y
Northern fulmar						Y

1435. The predicted impacts from these projects have not been considered in the quantitative assessment of the impacts from the Project in-combination with other reasonably foreseeable projects, as it is assumed that these projects will need to consider this Project in their in-combination assessments.

6.3.24.5.1 Kittiwake

1436. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Rousay SPA population is presented in **Table 6-163.** In-combination impacts from other OWFs, with the Project impacts, are also presented, with

Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-163. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the Rousay SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.05	0.01	0.05	0.03
Mortality - Non-breeding season (NatureScot)	0.12	0.02	0.12	0.05
Mortality - Autumn migration (BDMPS)	0.04	0.01	0.04	0.02
Mortality - Spring migration (BDMPS)	0.07	0.01	0.07	0.04
Annual Project alone mortality (collision + displacement)*	0.19		0.24	
Percentage point change in annual adult survival rate	0.03%		0.04%	
Annual in-combination mortality excl. Berwick Bank	4.84		5.18	
Percentage point change in annual adult survival rate	0.73%		0.78%	
Annual in-combination mortality incl. Berwick Bank	5.76		6.55	
Percentage point change in annual adult survival rate	0.87%		0.99%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1437. As change in adult survival rate from the Project alone impacts exceeded the 0.02% threshold, a PVA was required for Project alone impacts.

1438. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was also required to assess in-combination impacts.

1439. **Table 6-164** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the kittiwake population at Rousay SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1440. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-164. Rousay SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	0.2	0.0002850000	25	0.9996	0.9997	0.0039	0.9922	1.0072	0.9833	0.9961	0.1051	0.8160	1.2243	48.9	50.7
Project alone CRM+High	0.2	0.0003673842	25	0.9992	0.9994	0.0040	0.9918	1.0075	0.9830	0.9916	0.1060	0.8004	1.2298	49.0	50.3
Incomb CRM+Low ex. BB	4.8	0.0073410000	25	0.9913	0.9913	0.0040	0.9830	0.9990	0.7977	0.7996	0.0870	0.6381	0.9806	29.6	73.0
Incomb CRM+High ex. BB	5.2	0.0078443198	25	0.9906	0.9906	0.0040	0.9824	0.9987	0.7819	0.7864	0.0833	0.6333	0.9614	28.8	74.6
Incomb CRM+Low inc. BB	5.8	0.0087310000	25	0.9894	0.9896	0.0041	0.9816	0.9976	0.7606	0.7671	0.0855	0.6140	0.9500	26.2	75.3
Incomb CRM+High inc. BB	6.5	0.0099180851	25	0.9883	0.9882	0.0041	0.9800	0.9964	0.7359	0.7385	0.0824	0.5869	0.9034	24.2	78.9
Project alone CRM+Low	0.2	0.0002850000	35	0.9996	0.9996	0.0034	0.9930	1.0066	0.9828	0.9934	0.1271	0.7747	1.2943	48.9	51.0
Project alone CRM+High	0.2	0.0003673842	35	0.9992	0.9994	0.0035	0.9927	1.0061	0.9744	0.9855	0.1258	0.7652	1.2472	49.3	51.3
Incomb CRM+Low ex. BB	4.8	0.0073410000	35	0.9911	0.9912	0.0036	0.9841	0.9986	0.7267	0.7333	0.0966	0.5514	0.9392	24.5	74.7
Incomb CRM+High ex. BB	5.2	0.0078443198	35	0.9906	0.9906	0.0034	0.9841	0.9973	0.7099	0.7163	0.0917	0.5560	0.9066	23.7	75.5
Incomb CRM+Low inc. BB	5.8	0.0087310000	35	0.9896	0.9896	0.0036	0.9827	0.9966	0.6883	0.6936	0.0922	0.5237	0.8982	21.7	77.9
Incomb CRM+High inc. BB	6.5	0.0099180851	35	0.9883	0.9882	0.0037	0.9809	0.9950	0.6537	0.6564	0.0891	0.4971	0.8372	18.6	80.9
Project alone CRM+Low	0.2	0.0002850000	50	0.9997	0.9997	0.0031	0.9941	1.0057	0.9826	0.9983	0.1604	0.7266	1.3504	49.5	50.9
Project alone CRM+High	0.2	0.0003673842	50	0.9995	0.9995	0.0030	0.9938	1.0056	0.9760	0.9897	0.1576	0.7245	1.3392	48.9	51.3
Incomb CRM+Low ex. BB	4.8	0.0073410000	50	0.9937	0.9937	0.0030	0.9878	0.9999	0.7271	0.7315	0.1164	0.5211	1.0000	29.5	71.7
Incomb CRM+High ex. BB	5.2	0.0078443198	50	0.9931	0.9932	0.0032	0.9868	0.9994	0.7052	0.7146	0.1199	0.5093	0.9669	28.5	71.9
Incomb CRM+Low inc. BB	5.8	0.0087310000	50	0.9927	0.9926	0.0032	0.9864	0.9984	0.6895	0.6961	0.1144	0.4924	0.9377	25.1	74.2
Incomb CRM+High inc. BB	6.5	0.0099180851	50	0.9916	0.9916	0.0032	0.9851	0.9981	0.6521	0.6584	0.1094	0.4660	0.9019	22.7	75.9

1441. The C-PGR for Project alone impacts after 35 years for the highest impact scenario of high displacement and WCS collision was 0.9994 (95% c.i. 0.9927-1.0061) (**Table 6-164**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.06%. This very small change indicates that the PVA trajectories with Project-alone impacts are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the kittiwake population will be of a similar size after 35 years, in the presence of Project impacts, as would be expected in the absence of Project impacts.

The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9882 (95% c.i. 0.9809-0.9950) (**Table 6-164**). The predicted reduction in population growth rate under this highest impact worst case scenario was 1.18%. This predicted small change to population growth rate indicates that the kittiwake population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of only 0.24 birds per annum to the in-combination total of 6.6 birds per annum (including Berwick Bank impacts, worst case scenario).

1442. The kittiwake population at this SPA is well below the citation population size of 4,900 pairs and feature condition was Unfavourable Declining, when last assessed in June 2016. Population size at this colony increased by 88% between the two seabird censuses, Seabird 2000 and Seabirds Count, to 330 AONs (Burnell *et al.*, 2023). Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The kittiwake colony at Rousay SPA was not counted in 2023 with the purpose of assessing HPAI impacts on the population (Tremlett *et al.,* 2024). Kittiwake colonies showed a broad range of population change in 2023, compared with the Seabirds Count estimates, making it difficult to infer how the Rousay SPA kittiwake colony may have changed in response to any HPAI impacts.

1443. While the PVA indicates that the in-combination effect would reduce the population growth rate by up to 1.2% which could potentially bring about further decreases in population size, it is worth noting the actual magnitude of predicted in-combination mortality is less than 7 birds per year (and Project alone impacts are only 0.2 birds per year). Therefore, although the PVA results indicate this would constitute a significant impact, this largely reflects the current greatly reduced size of this population, which has resulted from factors other than offshore wind farms. Given this, the very small absolute Project alone and in-combination impacts will not prevent or reduce the potential for this feature to recover and to be restored in the long term.

1444. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the Rousay SPA, from collision and displacement impacts from the Project alone and in-combination.

6.3.24.5.2 Guillemot

1445. Predicted guillemot displacement mortality, by season, and change to annual adult survival rate apportioned to the Rousay SPA population is presented in **Table 6-165**. NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts (letter from NatureScot to the Project, dated 3 June 2024). However, Berwick Bank Wind Farm did not have connectivity with any of the SPAs with guillemot features, potentially impacted by the Project and so the in-combination assessment does not include any Berwick Bank impacts.

1446. Note, almost all breeding season Project alone guillemot mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-165. Estimated adult guillemot Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the Rousay SPA and change in baseline annual adult survival rate.
See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts for more details on calculation of mortalities and changes to survival rate.

GUILLEMOT	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.23	0.68
Mortality - Non-breeding season (BDMPS)	0.23	0.68
Annual Project alone mortality* (displacement)	0.23	0.68
Percentage point change in annual adult survival rate	<0.01%	0.01%
Annual in-combination mortality	3.49	9.93
Percentage point change in annual adult survival rate	0.04%	0.13%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1447. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1448. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

1449. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

1450. **Table 6-166** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the guillemot population at Rousay SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-166. Rousay SPA: Guillemot PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	0.2	0.000029	25	1.0000	1.0000	0.0007	0.9987	1.0013	0.9991	0.9998	0.0184	0.9644	1.0365	50.5	49.6
Project alone High	0.7	0.000085	25	0.9999	0.9999	0.0007	0.9985	1.0012	0.9978	0.9974	0.0188	0.9601	1.0333	49.2	50.7
Incomb Low	3.5	0.000441	25	0.9995	0.9995	0.0007	0.9982	1.0008	0.9872	0.9874	0.0188	0.9509	1.0260	47.5	52.9
Incomb High	9.9	0.001253	25	0.9986	0.9986	0.0007	0.9973	1.0000	0.9651	0.9650	0.0177	0.9307	1.0016	42.8	57.4
Project alone Low	0.2	0.000029	35	1.0000	1.0000	0.0006	0.9989	1.0010	0.9997	0.9996	0.0208	0.9599	1.0390	50.0	50.0
Project alone High	0.7	0.000085	35	0.9999	0.9999	0.0006	0.9987	1.0010	0.9961	0.9962	0.0212	0.9539	1.0377	49.4	50.4
Incomb Low	3.5	0.000441	35	0.9995	0.9995	0.0006	0.9984	1.0006	0.9830	0.9826	0.0210	0.9428	1.0251	47.7	52.1
Incomb High	9.9	0.001253	35	0.9986	0.9986	0.0006	0.9975	0.9997	0.9519	0.9516	0.0200	0.9135	0.9915	40.9	58.8
Project alone Low	0.2	0.000029	50	1.0000	1.0000	0.0004	0.9992	1.0008	0.9994	0.9999	0.0229	0.9576	1.0452	50.5	49.7
Project alone High	0.7	0.000085	50	0.9999	0.9999	0.0005	0.9990	1.0008	0.9965	0.9966	0.0237	0.9502	1.0423	49.1	50.4
Incomb Low	3.5	0.000441	50	0.9997	0.9997	0.0005	0.9987	1.0005	0.9828	0.9833	0.0233	0.9393	1.0291	47.5	51.7
Incomb High	9.9	0.001253	50	0.9990	0.9990	0.0004	0.9981	0.9999	0.9522	0.9520	0.0220	0.9090	0.9952	41.0	58.1

1451. Predicted Project alone impacts on the guillemot population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

1452. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, was 0.9986 (95% c.i. 0.9975-0.9997) (**Table 6-166**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.14%. This very small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the guillemot population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Additionally, the Project contributed a mortality of only 0.7 birds per annum to the in-combination total of 9.9 birds per annum (worst case scenario).

1453. The guillemot feature condition was Unfavourable No Change, when last assessed in June 2021. Population size at this colony remained relatively stable the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023), well below citation population size. Guillemot populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The Rousay SPA guillemot population was not counted in 2023 so any change in population size due to HPAI is unknown. Two Orkney colonies which were counted in 2023 showed marked differences in their population trend, with a 56% decline at Copinsay and a 7% increase at West Westray. Consequently, it is very difficult to predict whether the Rousay SPA guillemot population has remained stable or decreased due to HPAI impacts.

1454. Whilst the guillemot population at Rousay SPA is substantially smaller than citation population size and could have declined further due to HPAI impacts, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any further declines and will not prevent or reduce the potential for this population to recover and to be restored in the long term.

1455. Consequently, a conclusion of no AEoSI was reached for the guillemot feature of the Rousay SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.24.5.3 Fulmar

1456. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the Rousay SPA population is presented in **Table 6-167**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features.

Table 6-167. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities (birds per annum) apportioned to the Rousay SPA and change in baseline annual adult survival rate

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.026	0.078
Mortality - Non-breeding season (NatureScot)	0.025	0.074
Mortality - Autumn migration (BDMPS)	0.009	0.028
Mortality - Winter (BDMPS)	0.004	0.012
Mortality - Spring migration (BDMPS)	0.011	0.033
Annual Project alone mortality* (displacement)	0.051	0.152
Percentage point change in annual adult survival rate	0.001%	0.003%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1457. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination assessment was undertaken for fulmar.

1458. Fulmar feature condition is Favourable Maintained, when last assessed in June 2021. There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmar at Rousay SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

1459. The very small predicted mortality from Project impacts on this population will not prevent or reduce the potential for this feature to be maintained.

1460. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the Rousay SPA, from displacement and barrier impacts from the Project alone. No in-combination assessment was undertaken for fulmar.

6.3.24.6 Conclusions

1461. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Rousay SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1462. A conclusion of **no AEoSI** was reached for the **guillemot** feature of the **Rousay SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1463. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Rousay SPA**, from displacement and barrier impacts from the **Project alone**.

1464. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, guillemot and fulmar, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Rousay SPA**.

1465. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Rousay SPA** was reached.

6.3.25 Scapa Flow SPA

6.3.25.1 Site Description

1466. The Scapa Flow SPA was classified in February 2022 for its non-breeding waterbirds as well as breeding red-throated divers. The site is approximately 31 km east of the Project.

1467. The Scapa Flow Special Protection Area (SPA) is located in the Orkney Islands. Most of the site lies within the enclosed waters of Scapa Flow, sheltered by Orkney Mainland to the north, Hoy, South Walls and Flotta to the west and south and Burray and South Ronaldsay to the east. The Flow is linked to the Pentland Firth on the south through the Sound of Hoxa, and to the Atlantic Ocean on the west through Hoy Sound. Much of Scapa Flow is between 20 and 30m deep but there is a deeper trench at Brings Deeps reaching just over 60m depth. Shallower waters, particularly to the north and east, include Bay of Ireland, Bay of Houton, Swanbister Bay, Waulkmill Bay, Scapa Bay, Echnaloch Bay and Water Sound. Coastal shallows are also found around islands such as Flotta, Cava and Fara.

1468. The site also includes nearshore waters to the east of Orkney, between South Ronaldsay and Deerness, including the sheltered shallow waters of Holm Sound, between Burray and East Mainland. Prior to construction of the Churchill Barriers in World War II, there were openings between Scapa Flow and Holm Sound to the North Sea.

1469. A diverse range of seabed habitats, including muddy sands, tide swept sands and gravels, kelp forests and maerl beds, support a high diversity of marine life. These rich sheltered waters support large numbers of waterfowl, particularly in the winter months when frequent storms affect the surrounding North Sea and eastern Atlantic. The site is also used by breeding red-throated divers, which feed almost exclusively at sea close to their freshwater breeding sites in the moorlands of Hoy and Orkney Mainland

6.3.25.2 Conservation benefits

1470. The conservation benefits of the Scapa Flow SPA are:

- Protecting over 20% (approximately 505 birds) of the great northern diver (an Annex 1 rare and vulnerable species) GB population which regularly winter in this area, representing the third largest concentration of this species in Scotland;
- Protecting over 9.5% (approximately 57 birds) of the black-throated diver (an Annex 1 rare and vulnerable species) GB population which regularly winter in this area, representing the second largest concentration in Scotland;
- Protecting over 12% (approximately 135 birds) of the Slavonian grebe (an Annex 1 rare and vulnerable species) GB population which regularly winter in this area, representing the largest population in Scotland and GB;
- Protecting around 3% (approximately 2927 birds) of the European shag GB population which regularly winter in this area, representing the second largest concentration of this species in Scotland;
- Protecting in the following populations of non-breeding migratory waterfowl that regularly winter in this area: over 3% (approximately 1997 birds) of the common eider wintering GB population, representing the fourth largest wintering concentration of

this species in Scotland; over 6% (approximately 539 birds) of the red-breasted merganser wintering GB population, representing the largest wintering concentration of this species in Scotland; and c.13% (approximately 1395 birds) of the long-tailed duck wintering GB population, representing the third largest wintering concentration of this species in Scotland. Some of the wintering common eider, European shag, and red-breasted merganser may be present throughout the year and will contribute to the breeding population in the area;

- Protecting sheltered waters with rich marine habitats that support a diversity of pelagic and demersal fish, bivalve molluscs, gastropods and crustaceans where great northern diver, red-throated diver, black-throated diver, Slavonian grebe, European shag, common eider, long-tailed duck and red-breasted merganser can feed, moult and roost;
- Protecting foraging areas used by approximately 76 pairs of red-throated diver (an Annex 1 rare and vulnerable species), representing 6.1% of the GB population during their summer breeding season. These birds breed on freshwater lochs and lochans within a 10km radius of the SPA but catch marine fish such as sandeels to feed to their young.

6.3.25.3 Conservation Objectives for the SPA

1471. The conservation objectives of the Scapa Flow SPA are to:

   1. To ensure that the qualifying features of the Scapa Flow SPA are in favourable condition and make an appropriate contribution to achieving Favourable Conservation Status.
   2. To ensure that the integrity of the Scapa Flow SPA is maintained in the context of environmental changes by meeting objectives 2a, 2b and 2c for each qualifying feature:
      a. The populations of qualifying features are viable components of the site.
      b. The distribution of the qualifying features is maintained throughout the site by avoiding significant disturbance of the species.
      c. The supporting habitats and processes relevant to qualifying features and their prey/food resources are maintained.

1472. Of particular relevance to the West of Orkney Windfarm is Conservation Objective 2b, due to the Scapa Flow SPA being screened into the Appropriate Assessment for LSE from vessels associated with the Project having the potential to cause disturbance and displacement to the distribution of qualifying features. This Conservation Objective seeks to ensure that the qualifying features can continue to use and access all areas within the Scapa Flow SPA used for feeding, moulting, roosting, loafing, shelter and other maintenance activities.

1473. ‘Significant disturbance’ should be interpreted to mean disturbance that affects the integrity of the site through alteration of the distribution of the qualifying features such that recovery cannot be expected or effects can be considered long term. It is expected that significant disturbance will lead to more than a transient effect on the distribution of the qualifying features. It may result in the following types of effect:

- Contributes to the long-term decline in the use of the site by the qualifying features;
- Changes to the distribution of the qualifying features on a continuing or sustained basis;
- Changes to the qualifying features behaviour such that it reduces the ability of the species to survive, breed or rear their young.

6.3.25.4 *Qualifying Features*

1474. Species listed in **Table 6-168** are qualifying features of the Scapa Flow SPA.

Table 6-168. Qualifying interests and condition for the Scapa Flow SPA.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Great northern diver (non-breeding)	a mean peak annual non-breeding population of 505 birds (20.2% of the GB population) for the years 1998/99-2006/7	n/a	Condition Not Assessed	n/a	Amber
Red-throated diver (breeding)	up to 76 pairs (6.1% of the GB population) in 2006	n/a	Condition Not Assessed	n/a	Green
Black-throated diver (non-breeding)	a mean peak annual non-breeding population of 57 birds (9.5% of the GB population) for the years 1998/99-2006/7	n/a	Condition Not Assessed	n/a	Amber
Slavonian grebe (non-breeding)	a mean peak annual non-breeding population of 135 birds (12.3% of the GB population) for the years 1998/99-2006/7	n/a	Condition Not Assessed	n/a	Red
European shag (non-breeding)	a mean peak annual non-breeding population of 2,927 birds (1.5% of the biogeographic population) for the years of 1998/99 to 2006/07	n/a	Condition Not Assessed	n/a	Red
Common eider (non-breeding)	a mean peak annual non-breeding population of 1997 birds (3.6% of the GB population) for the years of 1998/99 to 2006/07	n/a	Condition Not Assessed	n/a	Amber

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Long-tailed duck (non-breeding)	a mean peak annual nonbreeding population of 1,395 birds (12.7% of the GB population) for the years of 1998/99 to 2006/07)	n/a	Condition Not Assessed	n/a	Red
Red-breasted merganser (non-breeding)	a mean peak annual non-breeding population of 539 birds (6.4% of the GB population) for the years of 1998/99 to 2006/07	n/a	Condition Not Assessed	n/a	Amber

1475. Scapa Flow SPA was classified using information on bird numbers and distribution collected during the non-breeding seasons of 1998/99 to 2006/07. More recent surveys were commissioned by NatureScot, during the 2017/18 non-breeding season (Jackson *et al.* 2018). Surveys were undertaken using a combination of shore-based vantage point counts and boat-based line-transect surveys. The figures below show the distribution of birds recorded during four survey periods: Round 1 = November to early December 2017; Round 2 = mid-December 2017 to early January 2018; Round 3 = mid-January to mid-February 2018; and Round 4 = March 2018.

1476. Peak counts of the Scapa Flow SPA qualifying non-breeding features, from 2017/18 and percentage of an estimate of the GB wintering population from approximately the same time (Musgrove *et al.* 2013) were:

- Great northern diver (non-breeding), 1,016 birds (≤40.6% GB);
- Black-throated diver (non-breeding), 39 birds (7.0% GB);
- Slavonian grebe (non-breeding), 161 birds (14.6% GB);
- European shag (non-breeding), 3,726 birds (3.4% GB, 1.9% biogeographic);
- Common eider (non-breeding), 2,324 birds (3.9% GB);
- Long-tailed duck (non-breeding), 1,996 birds (18.1% GB);
- Red-breasted merganser (non-breeding), 370 birds (4.4% GB);

1477. Compared with peak counts from 1998/99 and 2000/01, numbers of great northern divers had increased, while black-throated divers, European shag, red-breasted merganser and common goldeneye had decreased. See Jackson (2018) for more information.

1478. This site holds the largest aggregation of great northern divers in Great Britain. When the site was classified, the site was estimated to support approximately 40% of the GB wintering population. This has now been revised to 23% of the GB population, using more recent national counts (Woodward *et al.*, 2020). Nevertheless, the site remains the most important area in Britain for wintering great northern divers. Scapa Flow SPA is also important for Slavonian grebe, with the peak estimate of 161 birds (Jackson, 2018) representing 16.2% of the most recent UK wintering population estimate for this species (Woodward *et al*. 2020). Additionally, Scapa Flow SPA is an important site for long-tailed duck. Jackson (2018) recorded a peak count of 1,996 long-tailed ducks in Scapa Flow, which is 14.8% of the UK wintering long-tailed duck population.

6.3.25.5 *Potential for the Project to impact the site's Conservation Objectives*

1479. The Scapa Flow SPA was screened in for further assessment due to potential disturbance/displacement of the site's diver, seaduck and shag qualifying features, by vessels associated with the Project.

1480. Currently, the Project is not able to confirm which ports or harbours will be used for construction activities. Potential ports for marshalling and/or assembly are: Scapa Flow Deep water Quay, Port of Nigg, Port of Cromarty, Ardersier, Aberdeen Harbour (logistics only as unsuitable for marshalling or assembly), Leith or Dundee.

1481. The proposed Scapa Deep Water Quay is located in the east of Scapa Flow, within the Scapa Flow SPA, next to the parish of Holm, in the Bay of Deepdale. If the Project decides to use Scapa Deep Water Quay, vessels associated with the Project would pass through the Scapa Flow SPA when transiting between the Project and the Scapa Deep Water Quay.

1482. The Scapa Deep Water Quay is in the planning stage at present, with an application submitted in September 2023[54]. If consented and constructed, it will offer a deep water (>15m) quay, with additional laydown facilities, for construction/assembly and maintenance of offshore wind turbines (Scapa Deep Water Quay, Volume 1: Environmental Impact Assessment Report[55]).

1483. During operation, smaller vessels associated with routine maintenance will come from the Operations and Maintenance base which, for the purposes of this assessment, is assumed to be in Scrabster. Vessels transiting between the base and the Project would transit through the North Caithness Cliffs SPA marine extension (see North Caithness Cliffs SPA account for assessment of this impact pathway). However, Scapa Deep Water Quay could be used very occasionally by vessels required for specific maintenance tasks. These vessels will be very few in number and will be transiting between the port and Project for only a short period. Therefore, vessels associated with the operation & maintenance phase of the Project will have either no impact or a very small impact on the qualifying features of the Scapa Flow SPA and so no AEoSI can be concluded for vessel impacts arising during operation. The potential for vessels associated with the construction phase of the Project to impact the site's conservation objectives are considered further.

6.3.25.5.1 Estimated vessels numbers and the relative increase in vessels numbers using ports

1484. Most vessels associated with construction of the Project will spend most of the time in the Offshore Project Area (i.e. in the OAA in which the turbines and other infrastructure will be

[54] *Scapa Deep Water Quay | marine.gov.scot*

[55] *00010511 - Orkney Highland Council (per... EIA Report Vol 1 - 21 August 2023.pdf (marine.gov.scot)*

constructed, or the ECC). During construction, certain vessels will remain offshore for the entire season without entering any port and will therefore require regular servicing by offshore supply vessels. Other vessels will make regular port calls.

1485. The most recent 2019 data for AIS vessels passing through the whole harbour area of Scapa Flow was compared with the maximum number of vessel transits estimated in Scapa Flow associated with construction of the Project (**Table 6-169**). As Scapa Deep Water Quay is still in the planning process no AIS vessel traffic was recorded at this port in 2019. Scapa Deep Water Quay will have the capacity to be used for both foundation and WTG storage, marshalling and assembly. Therefore the maximum number of vessel transits to/from Scapa Deep Water Quay could be up to a worst case scenario estimate of 718 one way transits per annum.

1486. The addition of construction vessel activity associated with the Project could cause a very small increase (1.4%) to the volume of vessel traffic passing through Scapa Flow. As Scapa Deep Water Quay will be a new port, any vessel traffic in and out of this port associated with the Project would, theoretically be additional to current vessel activity.

Table 6-169. Estimated numbers of vessels arriving or departing through the whole harbour area of Scapa Flow, including the area adjacent to Scapa Deep Water Quay, in 2019, and the maximum estimated number of vessel transits to/from these ports by construction vessels associated with construction of the Project. The estimated maximum number of transits per year for Project vessels represents a worst case scenario.

Port	Vessel tracks (single journeys) crossing into harbour area	
	2019 AIS vessel track total count	Estimated maximum transits per year for construction of the Project
Scapa Flow, whole harbour area	51,298	718
Scapa Deep Water Quay	0	718

6.3.25.5.2 Indicative vessel transit routes

1487. Scapa Flow is frequently used by many vessels, as shown in **Figure 6-45**. Vessel density is particularly high in the west of Scapa Flow, close to Hoy, and is also high in the eastern part of the area. **Figure 6-45** also indicates the potential route that may be taken by vessels transiting to/from the Scapa Deep Water Quay through the Scapa Flow SPA heading towards/from the offshore Project. This indicative route follows existing shipping lanes.

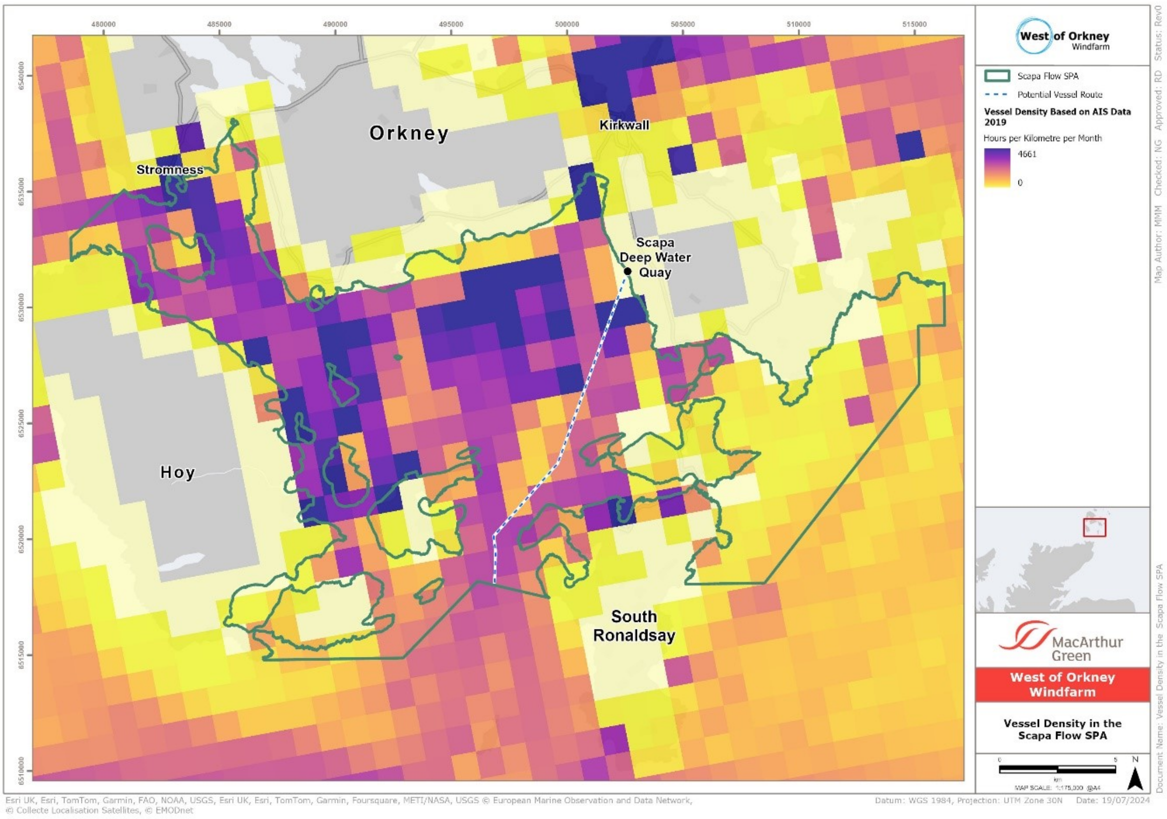


Figure 6-45. Vessel density in the Scapa Flow SPA in 2019. Vessel density data downloaded from the Marine Directorate's NMPi tool. Potential indicative routes that may be used by Project vessels to/from Scapa Deep Water Quay through the Scapa Flow SPA are indicated with a blue/white line.

6.3.25.5.3 An estimate of the percentage of the SPA populations that are likely to be impacted and the extent of the SPA impacted

1488. Vessel routes are not known at this stage. However, NatureScot requested (consultation meeting, 2 July 2024) that an estimate of the percentage of the SPA populations that is likely to be impacted and the extent of the SPA impacted was provided in this assessment. To calculate this, it was assumed that vessels would transit from the Scapa Deep Water Quay directly south, leaving Scapa Flow via the main navigational channel running between Flotta and South Ronaldsay. This route is 15.1 km in length from the port to the Scapa Flow SPA boundary.

1489. Evidence reviewed by Goodship and Furness (2022) suggests that most waterbirds have a flushing distance of <1 km. Consequently, a buffer of 1 km either side of the vessel track was applied to represent the area in which birds could potentially be disturbed and possibly displaced by the presence of a vessel on transit. A second highly precautionary scenario was considered, using the 2 km buffer that is advised by NatureScot for OWFs, i.e. assuming a buffer of 2 km either side of the vessel track.

1490. Assuming a 1 km buffer either side of the vessel track (i.e. a total disturbance area of 2 km wide by 15.1 km long, excluding any part of the area covered by land) gives an area of 30.2 km^2. Assuming a 2 km buffer either side of the vessel track (i.e. a total disturbance area of 4 km wide by 15.1 km long) gives an area of 60.4 km^2. The Scapa Flow SPA has an area of 318.1 km^2. This means that under the two scenarios, disturbance of birds could happen over an area of 9.5 % or 19 % of the SPA.

1491. However, this information does not take into account the distribution of birds through the SPA. The distribution of birds across the Scapa Flow SPA is discussed in detail below and the potential for vessel disturbance to impact the site's conservation objectives is considered.

1492. Additionally, this information also does not take into account the short-term nature of any disturbance caused by a vessel on transit between the Project and the port. Vessels passing through will only be present in an area for a short period of time, after which any disturbed birds can return to their behaviours they were undertaking prior to the disturbance. There may be a delay before birds return to the same area or behaviour, depending on the species' sensitivity to disturbance and also individual variation in response to presence of a vessel. However, the whole transit route will not be subject to disturbance at the same time and so the proportion of the SPA potentially affected by vessels at any one point in time, will be much smaller than the estimate provided above.

6.3.25.5.4 In-combination impacts with any other proposed developments within the Project timeframe

1493. Other OWFs which are currently in the planning process, including ScotWind and InTOG projects could also use Scapa Deep Water Quay for construction. In-combination with the Project, this could increase the volume of vessel traffic transiting through the SPA. However, OWF projects are constructed sequentially for many reasons, e.g. limited port capacity, limited vessel availability, etc. Therefore, multiple other OWF projects will not be under construction at the same time as the West of Orkney Windfarm and consequentially, the extent to which vessel traffic might increase will be constrained.

6.3.25.6 *Assessment of predicted impacts alone and in-combination*

1494. In a consultation meeting (24 June 2024), NatureScot advised that, "it would be helpful to include information on bird distributions within Scapa Flow, identifying areas of high densities of species susceptible to disturbance by vessels (i.e. divers and seaduck)". Consequently, information on the distribution of qualifying features of the Scapa Flow SPA is presented below in the assessment sections for each species. For all wintering features, this data was obtained from Jackson (2018) recorded during the 2017/2018 non-breeding season. The red-throated diver breeding feature distribution was obtained from Marine Directorate's NMPi mapping tool. Breeding distribution data illustrated on the red-throated diver map was recorded between 2003 to 2007.

6.3.25.6.1 Great northern diver

1495. Great northern divers have a high vulnerability to disturbance by boats (Furness *et al.*, 2013) moving away from the path of ferries up to 4 km away (Jarrett *et al.*, 2018). Goodship & Furness (2022) classed great northern divers as having a medium to high sensitivity to human disturbance. Goodship and Furness (2022) recommend a buffer zone of up to 350 m for non-breeding great northern divers.

1496. Jackson (2018) reported great northern divers occuring throughout the SPA, with high densities in the middle of Scapa Flow and lower densities in the western part of the SPA, adjacent to Hoy (**Figure 6-46**). Earlier studies of great northern diver distribution in Scapa Flow, approximately 15 years early, found a similar distribution with highest densities occurring in the middle and eastern side of Scapa Flow but relatively high densities throughout the area (see Marine Directorate NMPi great northern diver distribution map[56]). Great northern divers are present in Scapa Flow SPA from October to mid-May with a flightless moult period from February until mid-April (Scapa Flow SPA Conservation & Management Advice). During this period they may be more vulnerable to disturbance as they will be unable to fly away to other areas.

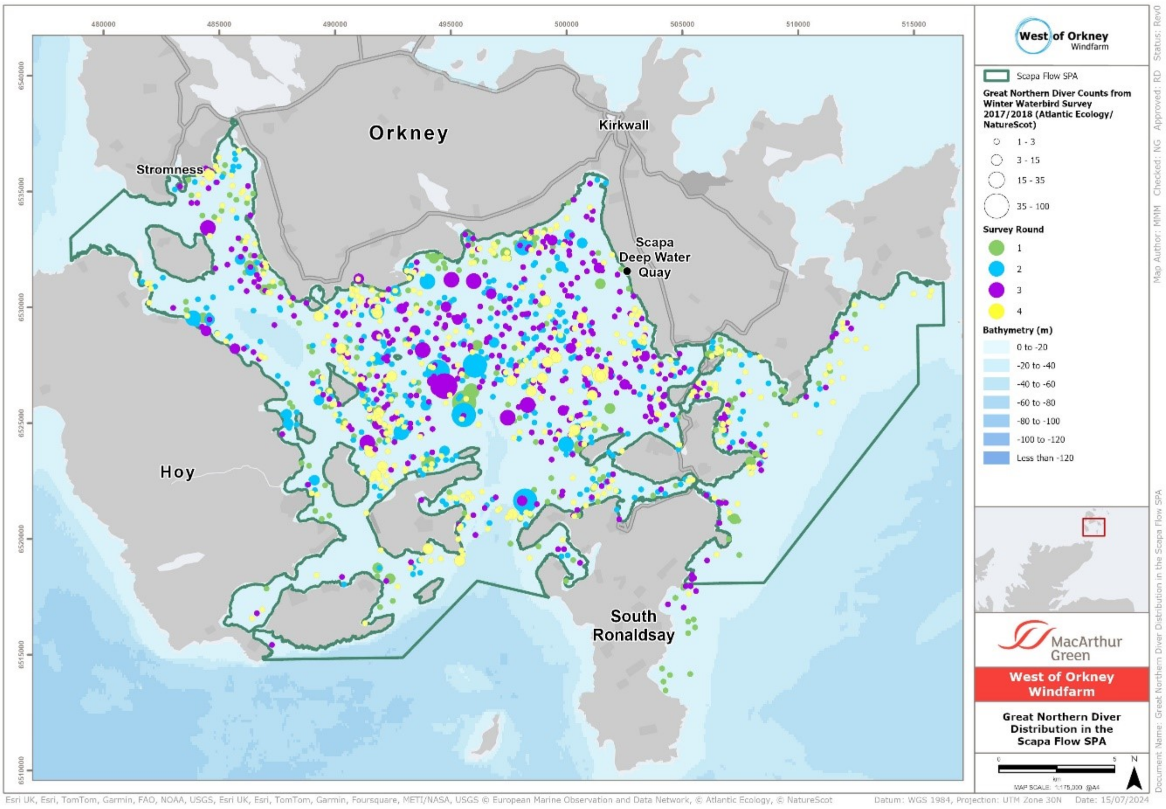


Figure 6-46. Great northern diver distribution in Scapa Flow from surveys during the 2017/2018 non-breeding season. Reproduced from Jackson (2018).

1497. Great northern divers were recorded in high numbers throughout most of the Scapa Flow, with the exception of an area close to Hoy. This means they could be using areas through which Project vessels could transit.

1498. Given that Scapa Flow SPA holds almost a quarter of the UK great northern diver wintering population and has a distribution that means vessels could transit through areas used by this species within the SPA, as well as the high sensitivity of this species to the presence of vessels, there is potential for disturbance/displacement of this species during construction and decommissioning. However, any displacement effect that does occur will be short-term,

[56] Marine Scotland - National Marine Plan Interactive (atkinsgeospatial.com)

both as a vessel passes through an area, after which birds would return to the area, and for the duration of the Project construction period, after which the feature would be expected to return to baseline conditions. The Scapa Flow SPA Conservation and Management Advice notes that:

- 'Significant disturbance' should be interpreted to mean disturbance that affects the integrity of the site through alteration of the distribution of the qualifying features such that recovery cannot be expected or effects can be considered long term.

1499. Any displacement effects that do occur would not cause significant disturbance, as defined above. Therefore, a conclusion is reached of no adverse effect on site integrity for this species.

6.3.25.6.2 Black-throated diver

1500. Black-throated divers were recorded in low numbers during the most recent counts of Scapa Flow, with a peak estimate of 39 individuals during the 2017/18 non-breeding season (Jackson, 2018), although this does represent an estimated 7% of the UK wintering population (Woodward, *et al.* 2020).

1501. Black-throated divers have a high sensitivity to human disturbance in the non-breeding season (Furness, *et al.* 2013; Goodship & Furness, 2022; Jarrett *et al.* 2018). Schwemmer *et al.* (2011) found black-throated divers avoided shipping lanes. Goodship & Furness (2022) recommend a buffer zone of up to 1 km to protect foraging and roosting birds from shipping disturbance.

1502. Black-throated divers were absent from the middle of Scapa Flow, being recorded along the Orkney mainland coast and in the west of Scapa Flow (**Figure 6-47**). Jackson (2018) noted that flocks tended to be highly mobile. Black-throated divers winter in Scapa Flow SPA from early August until late April, with a flightless moult period during mid-September and December.

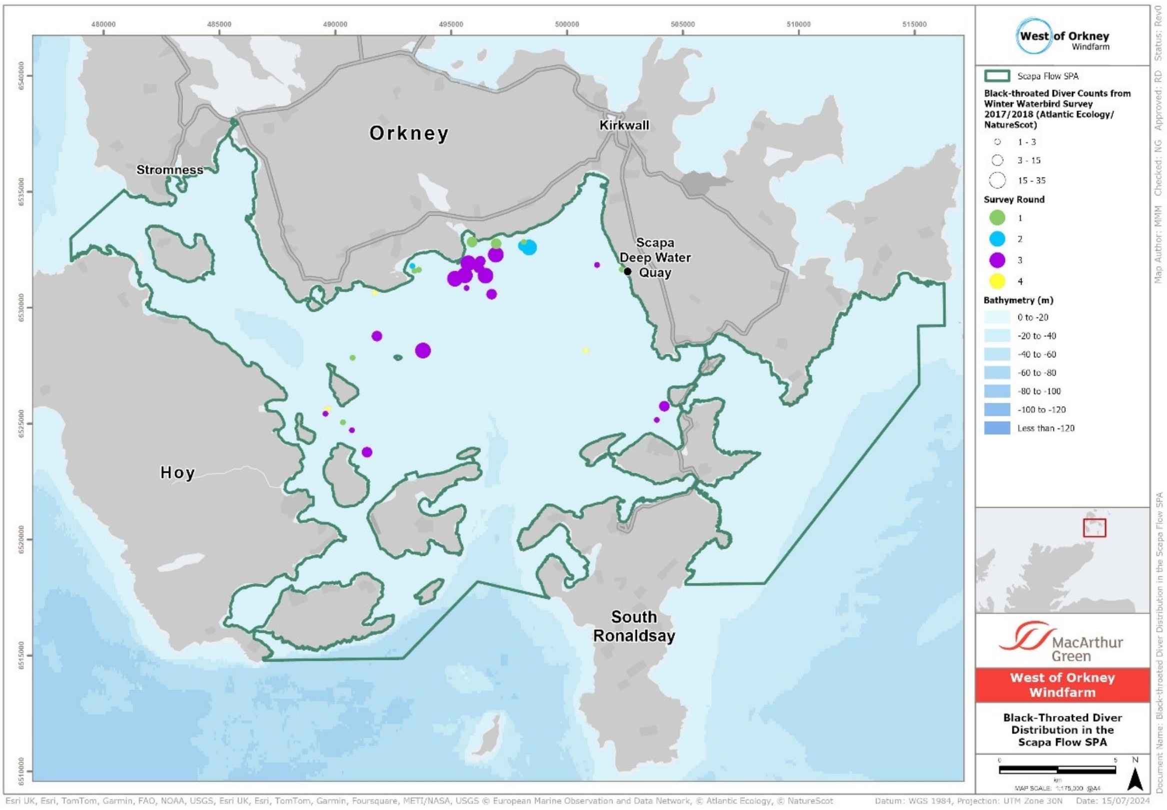


Figure 6-47. Black-throated diver distribution in Scapa Flow from surveys during the 2017/2018 non-breeding season. Reproduced from Jackson (2018).

1503. The 2017/18 Scapa Flow survey (Jackson, 2018) found black-throated diver distribution tended to be concentrated along the north and west of the Scapa Flow SPA, with large areas in the central and eastern part of Scapa Flow in which no black-throated divers were recorded. The Scapa Deep Water Quay is on the eastern edge of Scapa Flow, with vessels potentially transiting across Scapa Flow in an east-west direction or a south-west to north-east direction, depending on which direction vessels use to enter/exit Scapa Flow. The distribution of black-throated divers would not overlap with these transit routes.

1504. Whilst this species is highly sensitive to the presence of vessels, the distribution of black-throated divers in Scapa Flow confirms that there would be little spatial overlap between vessels transiting from the Scapa Deep Water Quay to the Project. Therefore, it is unlikely that black-throated divers would be displaced/disturbed by vessels associated with the Project and so a conclusion is reached of no adverse effect on site integrity for this species.

6.3.25.6.3 Slavonian grebe

1505. Slavonian grebes have a very high sensitivity to boat disturbance (Goodship & Furness, 2022). Slavonian grebes can be absent from areas where regular marine activity takes place. However, Slavonian grebes appear to habituate to regular presence of vessels, occurring in areas with frequent ferry and fishing vessel traffic in Orkney (Jackson, 2018).

1506. Slavonian grebes showed a strong preference for sheltered, relatively shallow parts of the survey area, with almost all records of this species occurring from land-based vantage point surveys and only 7 records from boat surveys (Jackson, 2018). During the surveys of 2017/18, Slavonian grebes were recorded along coastal areas around the whole of the Scapa Flow SPA, with the exception of the north-east coast of Hoy (**Figure 6-48**). Slavonian grebes are present in the site from mid-September to late April.

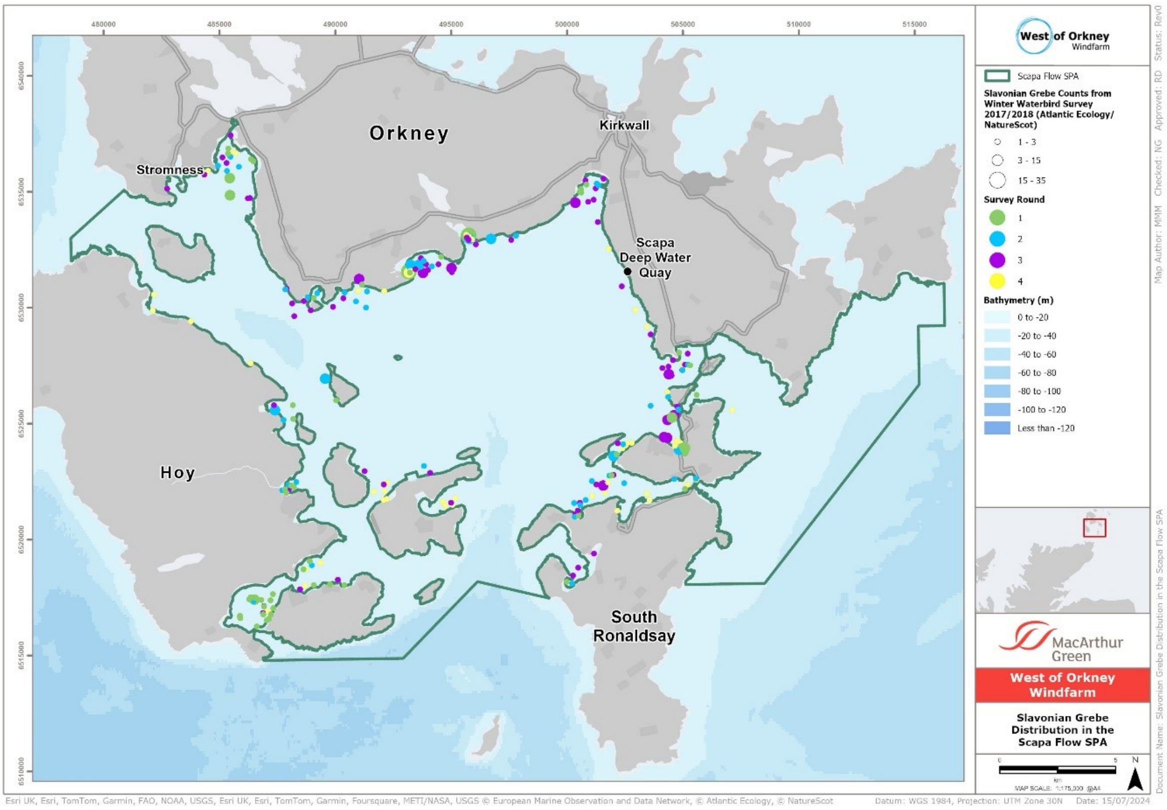


Figure 6-48. Slavonian grebe distribution in Scapa Flow from surveys during the 2017/2018 non-breeding season. Reproduced from Jackson (2018).

1507. As this species occurs only close inshore in shallow waters there is no overlap with potential vessel transit routes from Scapa Deep Water Quay.

1508. Despite Slavonian grebe being sensitive to the presence of vessels and Scapa Flow SPA holding nationally important numbers of this species, Project vessels will not disturb/displace this species as vessels will not transit through areas used by this species. Consequently, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.25.6.4 European shag

1509. European shag have a moderate sensitivity to boat disturbance, with Bradbury *et al.* (2014) giving shags a score of 3 for disturbance susceptibility (on a scale of 1 to 5).

1510. European shags were recorded throughout the Scapa Flow SPA but were absent from the centre of Scapa Flow (**Figure 6-49**), presumably due to limited foraging opportunities due to the deeper waters in this area (Jackson, 2018). European shags are present throughout the year in Scapa Flow SPA, with their non-breeding period from late September to early February.

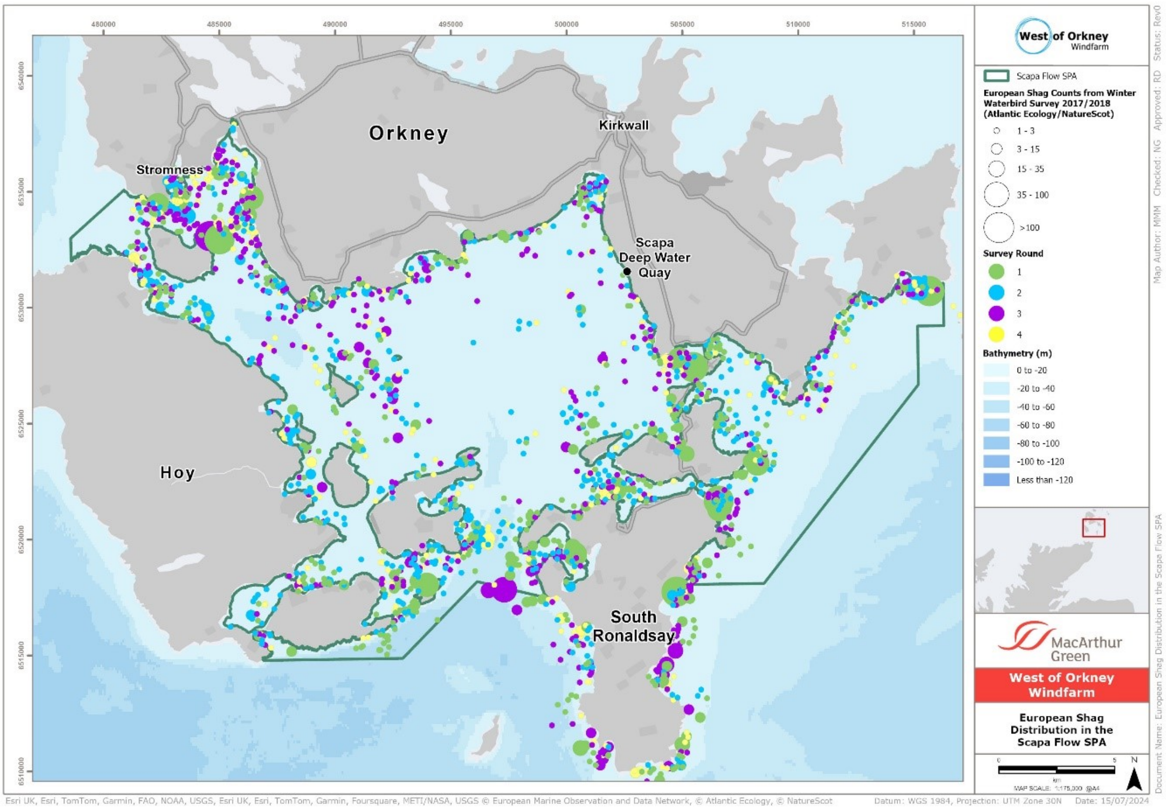


Figure 6-49. European shag distribution in Scapa Flow from surveys during the 2017/2018 non-breeding season. Reproduced from Jackson (2018).

1511. Shags were rare along the indicative transit routes from Scapa Deep Water Quay, with the exception of the entrance/exit route to Scapa Flow, where vessels would pass close to the islands of Flotta (southerly exit) or Graemsay (westerly exit). In these areas, vessels could pass near areas with higher densities of shags.

1512. Given that shags have a moderate susceptibility to disturbance by vessels and the generally inshore distribution of this species, there is low potential for vessels to cause disturbance/displacement of this feature. Consequently, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.25.6.5 Common eider

1513. Common eiders have a medium to high sensitivity to human disturbance (Goodship & Furness, 2022). Eiders can be disturbed by boats that are moving quickly through foraging, roosting and moulting areas (Goodship & Furness, 2022). Eider foraging activity has been demonstrated to be reduced by boat disturbance (Merkel *et al.* 2009). Goodship & Furness (2022) recommended a buffer zone of up to 500 m for eiders in the non-breeding season to protect roosting and foraging birds from disturbance from watercraft.

1514. Eiders were recorded around the coast of Scapa Flow with particularly high counts along the western edge (east coast of Hoy) and south of Graemsay (**Figure 6-50**). Eiders were very rarely seen in the centre of Scapa Flow and were mostly absent from the north east coast of Scapa Flow, in the vicinity of the planned Scapa Deep Water Quay. As benthic feeders, eiders are constrained to water <3 m deep although they also roost on the sea, in areas of deeper water (Snow & Perrins, 1998). Eiders are present throughout the year in Scapa Flow. Their non-breeding season is September to mid-April, with a flightless moult period of July to mid-September.

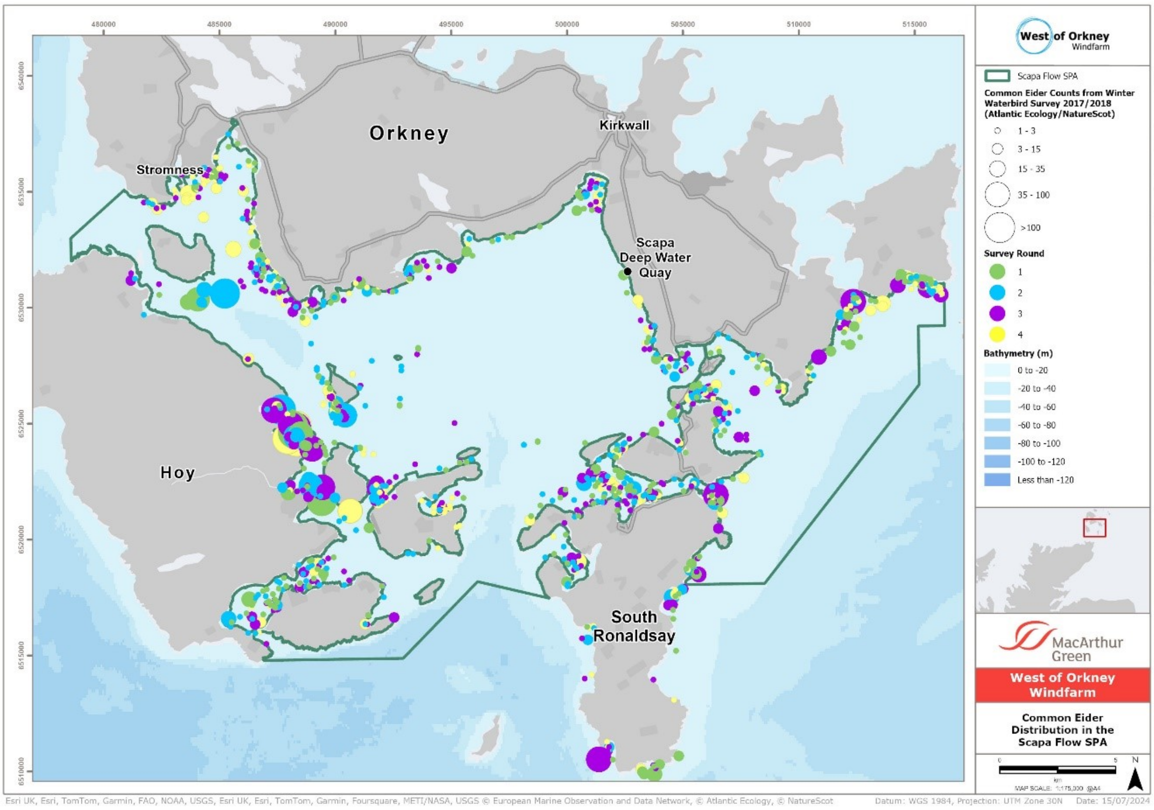


Figure 6-50. Common eider distribution in Scapa Flow from surveys during the 2017/2018 non-breeding season. Reproduced from Jackson (2018).

1515. As eiders have a close inshore distribution there would be limited overlap between areas of higher eider density and transiting vessels in the proximity of Scapa Deep Water Quay. Vessels existing Scapa Flow to the west, near to Stromness, could transit close to areas of higher eider density. However, if vessels exit via a southerly route, around the south end of Hoy, transiting vessels will not encounter any large aggregations of eiders.

1516. Given that most of the areas that are likely to be used by vessels associated with the Project have low densities of eiders, there is low potential for vessels to cause disturbance/displacement of this feature. Consequently, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.25.6.6 Long-tailed duck

1517. Long-tailed duck have a moderate sensitivity to boat disturbance, with Bradbury *et al.* (2014) giving this species a score of 3 for disturbance susceptibility (on a scale of 1 to 5). Jackson (2018), while counting long-tailed ducks from a vessel in Scapa Flow, noted birds flying off while being counted, with them alighting a few hundreds of metres away or flying further, suggesting higher sensitivity to the presence of vessels.

1518. Long-tailed duck had a similar distribution to eiders, often feeding in the same locations (Jackson, 2018). Like eider, few birds were recorded in the middle of Scapa Flow, with most long-tailed ducks occurring close to the coast (**Figure 6-51**). Jackson (2018) noted that both eider and long-tailed ducks tended to be associated with fish farms. Long-tailed duck are present in the site from mid-September to late April.

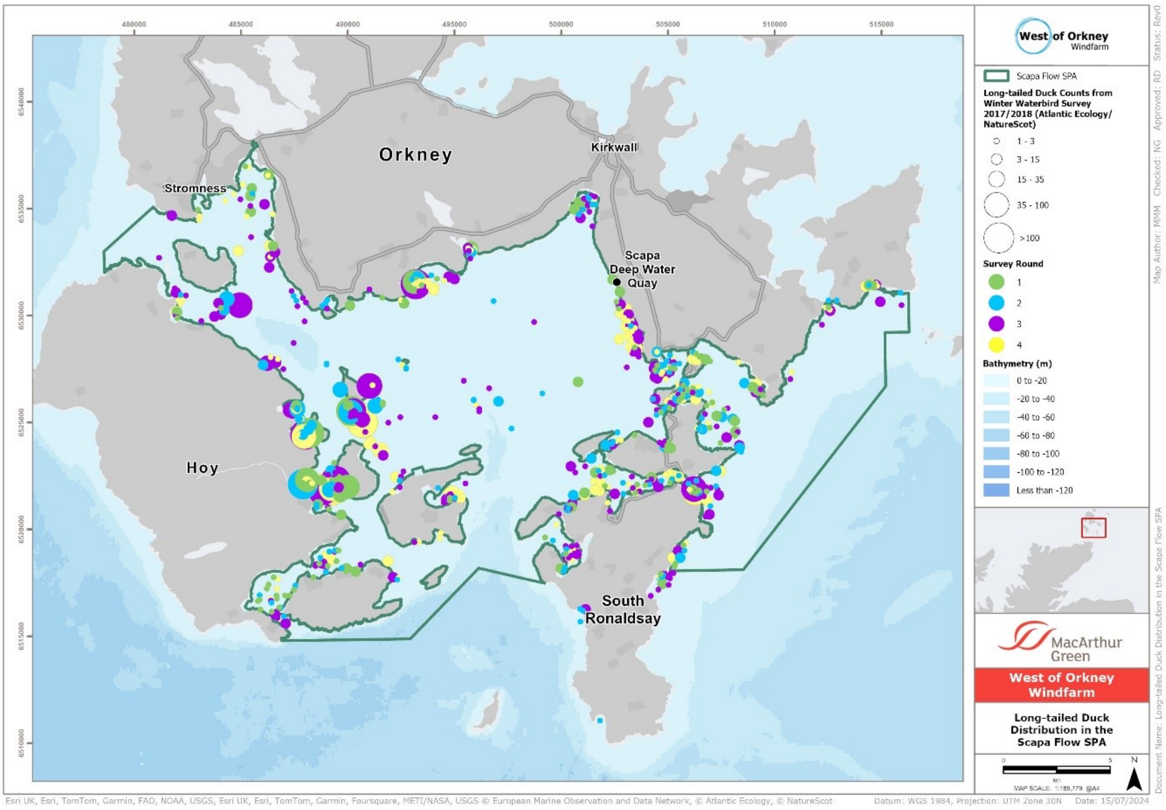


Figure 6-51. Long-tailed duck distribution in Scapa Flow from surveys during the 2017/2018 non-breeding season. Reproduced from Jackson (2018).

1519. The inshore distribution of long-tailed ducks in Scapa Flow suggests that there would be limited overlap between areas of higher long-tailed duck density and transiting vessels in the proximity of Scapa Deep Water Quay. Vessels existing Scapa Flow to the west, near to Stromness, could transit close to areas of higher long-tailed duck density. However, if vessels exit via a southerly route, around the south end of Hoy, transiting vessels would not be expected to encounter any large aggregations of long-tailed ducks.

1520. Given that most of the areas that are likely to be used by vessels associated with the Project have low densities of long-tailed ducks, and the moderate sensitivity of this species to the presence of vessels, there is low potential for vessels to cause disturbance/displacement of this feature. Consequently, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.25.6.7 Red-breasted merganser

1521. Red-breasted merganser have a moderate sensitivity to boat disturbance, with Bradbury *et al.* (2014) giving this species a score of 3 for disturbance susceptibility (on a scale of 1 to 5). However, Mendel *et al.* (2008) and Jarrett *et al.* (2018) noted the sensitivity of red-breasted mergansers to vessel movements.

1522. Red-breasted mergansers occurred almost exclusively along sheltered coastlines in Scapa Flow and were close inshore (Jackson, 2018). No red-breasted mergansers were recorded in the centre of Scapa Flow (**Figure 6-52**). They are usually found <2 km from the coast, although may roost further offshore. Red-breasted mergansers are present in the site throughout the year, with the wintering population comprising local breeding birds and supplemented by birds from elsewhere. The non-breeding season is from mid-August to late March, with a flightless moult period in July-September.

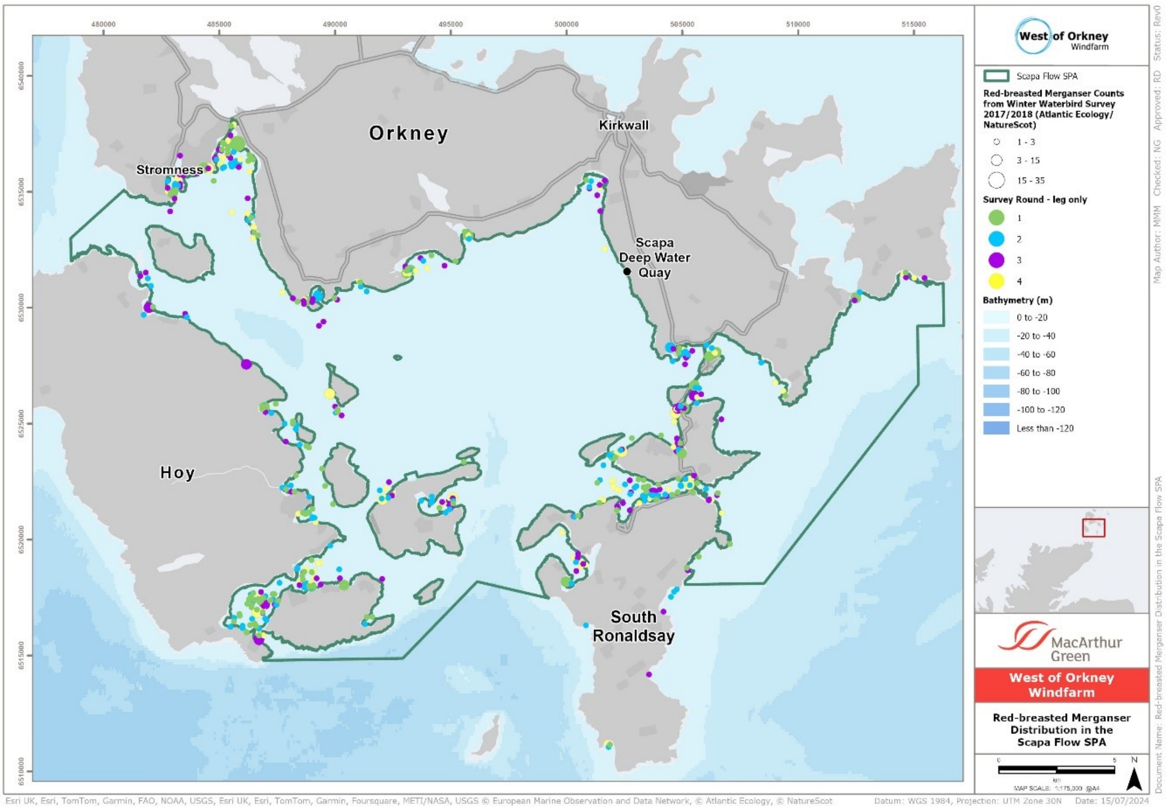


Figure 6-52. Red-breasted merganser distribution in Scapa Flow from surveys during the 2017/2018 non-breeding season. Reproduced from Jackson (2018).

1523. Red-breasted mergansers were only recorded close inshore in sheltered coastal areas within Scapa Flow. No red-breasted mergansers were recorded in areas that could be used by transiting vessels. Given this, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.25.6.8 Red-throated diver

1524. Red-throated divers have a high sensitivity to boat disturbance (Furness *et al.* 2013). Red-throated divers avoid shipping lanes and will fly away from approaching vessels at a distance of >1 km (S. O'Brien, *pers. obs.*, Schwemmer *et al.* 2011). Burger *et al.* (2019) found red-throated divers in the German Bight to be more abundant in areas of no or little ship traffic and found a strong negative effect of ship speed on the rate at which divers returned to areas after being flushed by a vessel. Burger *et al.* (2019) recommended restricting vessels to shipping lanes and applying speed limits to vessels to reduce the extent of disturbance. Mendel *et al.* (2019) also reported red-throated divers changing their distribution due to ship traffic and OWFs. Goodship and Furness (2022) recommended a breeding season buffer zone of up to 750 m and a non-breeding season buffer zone of up to 1 km for this species.

1525. Red-throated divers are a breeding season feature of the Scapa Flow SPA, using the site for feeding and other maintenance behaviours, while nesting on small lochans on Hoy and mainland Orkney. Their distribution in Scapa Flow reflects their breeding location, with highest numbers seen in the west of Scapa Flow (i.e. the east coast of Hoy) and along the north-western side of Scapa Flow (**Figure 6-53**). Black *et al.* (2014) found red-throated divers to forage in coastal waters within 10 km of their nest site. The main breeding season for red-throated divers is May to mid-September, with a post-breeding flightless moult period, although this may occur away from the Scapa Flow SPA. SPA birds have year round protection, including outside of the SPA, but these individuals would not be vulnerable to displacement/disturbance by vessels associated with the Project away from the SPA.

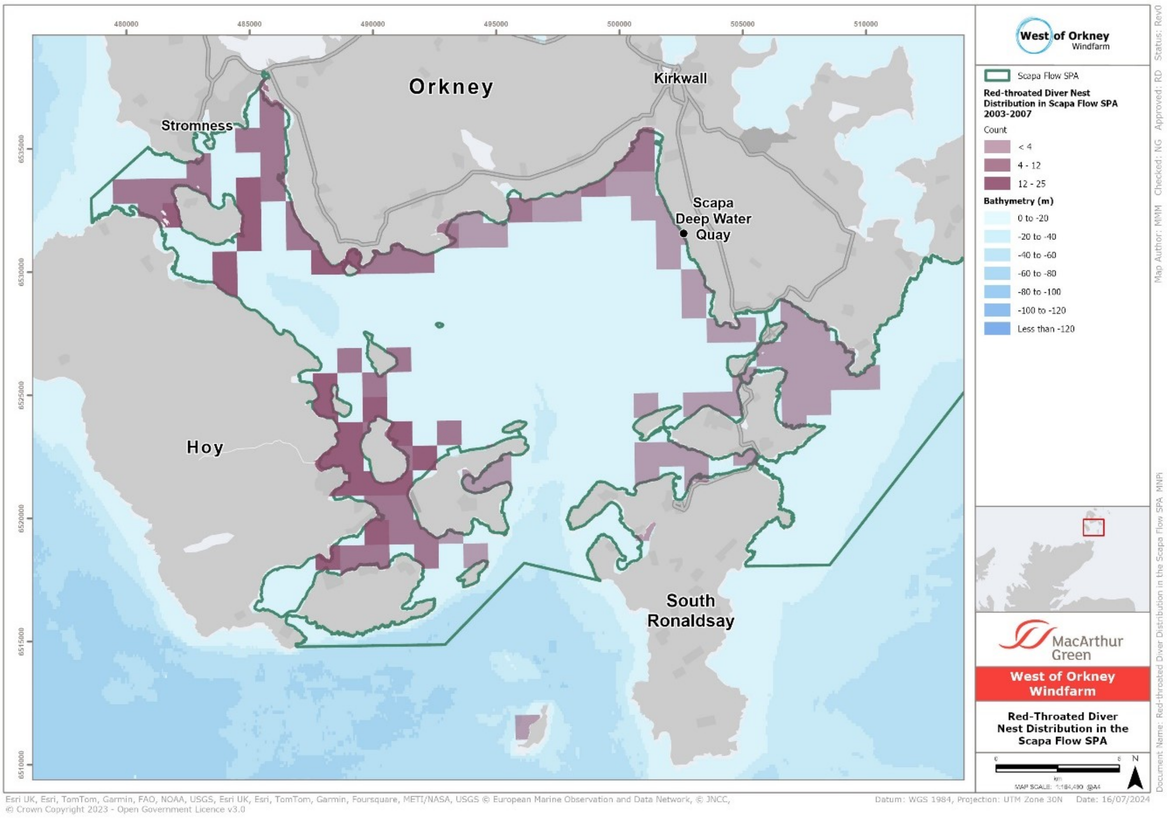


Figure 6-53. Red-throated diver breeding distribution in Scapa Flow. Data downloaded from the Marine Directorate's NMPi mapping tool - this data represents the outputs

of GAM modelling and analysis of nesting locations within foraging distance. Modelled outputs are assigned to 1 km by 1 km cells.

1526. There will is little overlap between indicative vessel transit routes with the marine SPA and red-throated diver distribution, due to this species being concentrated in areas to the west and north-west of the SPA, well away from the Scapa Deep Water Quay. Scapa Flow Conservation and Management Advice[57] notes that the more restricted breeding season distribution of red-throated divers in Scapa Flow will limit potential exposure to large marine developments.

1527. Vessels transiting between the Project and Scapa Deep Water Quay would not pass through any areas of high densities of red-throated divers if vessels exited Scapa Flow via a southerly route. Exiting via a westerly route could bring vessels in closer proximity to higher densities of red-throated divers around the northern end of Hoy, the island of Graemsay and mainland Orkney. However, given this species' preference for shallow, sandy, inshore areas, it is likely that vessels would be sufficiently distant from any high density areas, meaning that any disturbance/displacement is unlikely.

1528. Given this, a conclusion of no adverse effect on site integrity for this feature is reached.

6.3.25.7 Conclusions

1529. A conclusion of **no adverse effect on site integrity** is reached for all qualifying features of the **Scapa Flow SPA** from both **Project alone** and **in-combination** potential vessel impacts. However, noting the importance of the site for great northern diver, the potential overlap with vessel routes and the moderate to high sensitivity of this species to the presence of vessels, further consideration is given to minimising the possibility of disturbance/displacement to that species by vessels associated with the Project.

6.3.25.8 Potential mitigation measures

1530. The site's Conservation and Management Advice[58] advises that for 'boat use associated with both commercial and recreational activities', for diver and seaduck qualifying features and/or named components of the wintering waterbird assemblage feature, the following should be undertaken to support site management:

- Reduce or limit pressures (disturbance) associated with boat use during commercial and recreational activities through effective mitigation such as:
- following the Scottish Marine Wildlife Watching Code (SMWWC);
- seasonal restrictions to avoid sensitive time periods for those protected features most susceptible to disturbance; and/or
- production of vessel management plans associated with activities that require a marine licence. This may include agreed routes and for boats, potential seasonal speed restrictions.

[57] SiteLink - Scapa Flow SPA (nature.scot)

[58] SiteLink - Outer Firth of Forth and St Andrews Bay Complex SPA (nature.scot)

1531. An outline Navigational Safety and Vessel Management Plan was submitted with the West of Orkney Windfarm application[59]. This will be further developed post-consent, once there is certainty over which ports/harbours will be used during construction. Vessels will be required to adhere to the Vessel Management Plan, including adhering to embedded mitigation measures and to follow existing shipping routes where possible.

1532. Despite no AEoSI, the following mitigation measures are proposed to ensure no adverse effect on site integrity:

- Project vessels will limit their speed while transiting through the SPA to 10 kts; and
- Preconstruction/mobilisation briefings will be used to highlight bird sensitivity to vessel movements and the mitigations required in order to minimise potential impacts to birds in marine SPAs;
- The vessel crew will watch for aggregations of seabirds on the water and, if aggregations are seen, will alter the vessel's Master. Where necessary and having regard to maritime safety, the vessel's course and/or speed will be adjusted to avoid aggregations of birds.

1533. Limiting a vessel's speed will reduce disturbance as marine birds have been shown to be less likely to be displaced by slower moving vessels. It will also reduce engine noise, which can also disturb birds. Avoiding aggregations of birds on the water will also reduce disturbance, although the most sensitive species, such as great northern diver, may react to the presence of the vessel before they are readily visible to the crew.

[59] omp4 - outline navigation and safety and vessel management plan.pdf (marine.gov.scot)

6.3.26 St Abb's Head to Fast Castle SPA

6.3.26.1 *Site Description*

1534. The St Abb's Head to Fast Castle SPA was classified on 11 August 1997, with marine extension classified on 25 September 2009. The site is approximately 338 km south-west of the Project.

1535. St Abb's Head to Fast Castle SPA comprises an area of sea cliffs and coastal strip stretching over 10km along the Berwickshire Coast north of St Abbs. The boundary of the SPA overlaps with that of St Abb's Head to Fast Castle SSSI, and the seaward extension extends approximately 1 km into the marine environment to include the seabed, water column and surface.

6.3.26.2 *Conservation Objectives for the SPA*

1536. The conservation objectives of the St Abb's Head to Fast Castle SPA are to:

- 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
- 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.

6.3.26.3 *Qualifying features*

1537. The qualifying features of the SPA are presented below in **Table 6-170**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

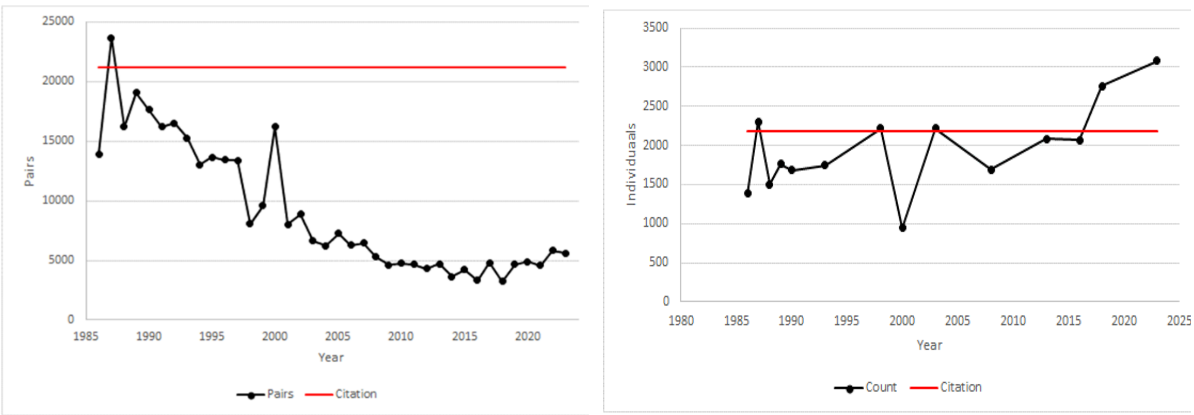
Table 6-170. Qualifying interests and condition for the St Abb's Head to Fast Castle SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake*	21,170 pairs, 4% of the GB population	5,150 pairs	Unfavourable Recovering	1 June 2021	Red
Herring gull*	1,160 pairs, 0.7% of the GB population	336 pairs	Unfavourable Recovering	1 June 2021	
Guillemot*	31,750 individuals, 3% of the GB population	45,827 individuals	Favourable Maintained	1 June 2018	Amber
Razorbill*	2,180 individuals, 1% of the GB population	2,931 individuals	Favourable Maintained	1 June 2018	

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Shag*	560 pairs, 1% of the GB population	163 pairs	Unfavourable Recovering	1 June 2021	
Seabird assemblage	regularly supports 79,560 seabirds including nationally important populations	n/a	Unfavourable Declining	14 June 2014	n/a

1538. St Abb's Head to Fast Castle SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 80,000 seabirds including nationally important populations of the following species: black-legged kittiwake, common guillemot, razorbill, European shag and herring gull.

1539. For the qualifying features for which the site was screened in for further assessment (except the breeding seabird assemblage) colony count data between 1986 and 2023 (the most recent count) was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-54**).



Kittiwake

Razorbill

Figure 6-54 St Abb's Head to Fast Castle SPA kittiwake qualifying feature population trends from 1989 - 2014 (citation population size shown by red line).

6.3.26.4 Potential for the Project to impact the site's conservation objectives

1540. The St Abb's Head to Fast Castle SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **razorbill** qualifying feature, during the non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the non-breeding season;

- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the non-breeding season.

1541. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

1542. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

1543. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.26.5 Assessment of predicted impacts for Project alone and in-combination

1544. An in-combination assessment was undertaken that collated quantitative information on impacts to features of this SPA from published consent applications. Other reasonably foreseeable projects which have not yet submitted an application may also impact some of the qualifying features of this site. MD-LOT advised (by email, 10 June 2024) that a qualitative assessment of OWF projects for which a Scoping Opinion has been adopted should be undertaken.

1545. OWF projects for which a Scoping Opinion has been adopted and which identified possible impacts from their project on the St Abb's Head to Fast Castle SPA, in their Scoping Reports, are listed

1546. Other reasonably foreseeable projects have not yet submitted an application and may also impact some of the qualifying features of the St Abb's Head to Fast Castle SPA. These are summarised in **Table 6-171**.

Table 6-171. In-combination project with the potential to impact the St Abbs' head to Fast Castle SPA that have not yet submitted an application. Only features which could be impacted by Project impacts are listed

SPA qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Black-legged kittiwake					Y	
Razorbill			Y		Y	

1547. The predicted impacts from these projects have not been considered in the quantitative assessment of the impacts from the Project in-combination with other reasonably foreseeable projects, as it is assumed that these projects will need to consider this Project in their in-combination assessments.

6.3.26.5.1 Kittiwake

1548. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Buchan St Abb's Head to Fast Castle SPA population is presented in **Table 6-172**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-172. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the St Abb's Head to Fast Castle SPA and change in baseline annual adult survival rate.

See ***Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts*** *for more details on calculation of mortalities and changes to survival rate.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.22	0.04	0.22	0.11
Mortality - Autumn migration (BDMPS)	0.08	0.01	0.08	0.03
Mortality - Spring migration (BDMPS)	0.14	0.03	0.14	0.07
Annual Project alone mortality* (collision + displacement)	0.26		0.33	
Percentage point change in annual adult survival rate	<0.01%		<0.01%	
Annual in-combination mortality excl. Berwick Bank	16.91		19.87	
Percentage point change in annual adult survival rate	0.16%		0.19%	
Annual in-combination mortality incl. Berwick Bank	68.05		85.63	
Percentage point change in annual adult survival rate	0.66%		0.83%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1549. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1550. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

1551. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

1552. **Table 6-173** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the kittiwake population at St Abb's Head to Fast Castle SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1553. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-173. St. Abbs Head to Fast Castle SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	0.3	0.00002508371	25	1.0000	1.0000	0.0010	0.9979	1.0020	1.0000	1.0001	0.0279	0.9458	1.0526	49.9	50.2
Project alone CRM+High	0.3	0.00003189275	25	1.0000	1.0000	0.0010	0.9980	1.0021	0.9999	0.9998	0.0280	0.9488	1.0572	49.3	50.6
Incomb CRM+Low ex. BB	16.9	0.00164162693	25	0.9981	0.9981	0.0011	0.9959	1.0001	0.9525	0.9521	0.0272	0.8996	1.0061	44.0	55.7
Incomb CRM+High ex. BB	19.9	0.00192865680	25	0.9977	0.9977	0.0010	0.9958	0.9997	0.9416	0.9429	0.0265	0.8954	0.9949	42.6	57.5
Incomb CRM+Low inc. BB	68.1	0.00660682595	25	0.9922	0.9922	0.0011	0.9900	0.9945	0.8157	0.8160	0.0247	0.7706	0.8668	30.6	72.1
Incomb CRM+High inc. BB	85.6	0.00831324496	25	0.9901	0.9902	0.0011	0.9879	0.9923	0.7723	0.7741	0.0232	0.7271	0.8213	26.6	75.9
Project alone CRM+Low	0.3	0.00002508371	35	1.0000	1.0000	0.0009	0.9982	1.0017	0.9992	0.9998	0.0332	0.9370	1.0604	50.2	49.9
Project alone CRM+High	0.3	0.00003189275	35	1.0000	1.0000	0.0009	0.9982	1.0017	0.9988	0.9989	0.0318	0.9347	1.0634	49.5	50.4
Incomb CRM+Low ex. BB	16.9	0.00164162693	35	0.9981	0.9981	0.0009	0.9962	0.9998	0.9332	0.9337	0.0310	0.8732	0.9956	44.6	56.1
Incomb CRM+High ex. BB	19.9	0.00192865680	35	0.9977	0.9977	0.0009	0.9961	0.9994	0.9215	0.9218	0.0306	0.8640	0.9806	43.0	56.5
Incomb CRM+Low inc. BB	68.1	0.00660682595	35	0.9922	0.9922	0.0010	0.9903	0.9940	0.7548	0.7549	0.0271	0.7025	0.8085	27.3	71.4
Incomb CRM+High inc. BB	85.6	0.00831324496	35	0.9902	0.9902	0.0010	0.9883	0.9921	0.7017	0.7015	0.0249	0.6531	0.7539	22.0	77.0
Project alone CRM+Low	0.3	0.00002508371	50	1.0000	1.0000	0.0008	0.9983	1.0016	0.9993	0.9995	0.0403	0.9187	1.0826	49.6	50.1
Project alone CRM+High	0.3	0.00003189275	50	1.0000	1.0000	0.0008	0.9984	1.0015	0.9984	0.9994	0.0399	0.9205	1.0779	50.0	50.1
Incomb CRM+Low ex. BB	16.9	0.00164162693	50	0.9986	0.9986	0.0007	0.9972	1.0001	0.9324	0.9338	0.0364	0.8643	1.0076	45.0	55.2
Incomb CRM+High ex. BB	19.9	0.00192865680	50	0.9984	0.9984	0.0008	0.9969	0.9999	0.9218	0.9215	0.0360	0.8545	0.9955	43.4	56.7
Incomb CRM+Low inc. BB	68.1	0.00660682595	50	0.9945	0.9945	0.0008	0.9928	0.9961	0.7542	0.7545	0.0329	0.6887	0.8194	30.1	70.2
Incomb CRM+High inc. BB	85.6	0.00831324496	50	0.9930	0.9930	0.0008	0.9914	0.9948	0.7002	0.7012	0.0305	0.6419	0.7695	26.7	74.0

1554. Predicted Project alone impacts on the kittiwake population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

1555. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9902 (95% c.i. 0.9883-0.9921) (**Table 6-173**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.98%. This predicted small change to population growth rate indicates that the kittiwake population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of only 0.33 birds per annum to the in-combination total of 86 birds per annum (including Berwick Bank Wind Farm impacts, worst case scenario). The in-combination total excluding Berwick Bank Wind Farm impacts was 20 birds per annum, which resulted in a change in population growth rate of 0.23%, i.e. Berwick Bank Wind Farm impacts comprise a substantial proportion of the in-combination impacts.

1556. The kittiwake feature condition is Unfavourable Recovering, when last assessed in June 2021. The population is well below citation population size of 21,170 pairs[60]. Population size at this colony decreased by 68% between the two seabird censuses, Seabird 2000 and Seabirds Count, to 5,150 AON (Burnell *et al.*, 2023). However, over the last 15 years the population has remained stable and there is an indication that it has increased over the last 10 years. Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024) but the St Abb's Head to Fast Castle SPA kittiwake population had remained stable, with a similar population size to the Seabirds Count estimate, when counted in 2023.

1557. A maximum reduction in growth rate of up to 1% due to in-combination mortality (approximately half of which is accounted for by the proposed Berwick Bank Wind Farm) would not be expected to result in a population decline but may delay recovery to the designated size. The Project contribution to in-combination impacts is predicted to be only 0.33 birds per annum, under a worst case scenario. Therefore, in-combination wind farm mortality is not considered to materially alter the status of the population and will not have a significant effect on the St. Abbs Head to Fast Castle SPA kittiwake population.

1558. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the St Abb's Head to Fast Castle SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.26.5.2 Razorbill

1559. Predicted razorbill displacement mortality, by season, and change to annual adult survival rate apportioned to the St Abb's Head to Fast Castle SPA population is presented in **Table 6-174**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

[60] *SiteLink - St Abb's Head to Fast Castle SPA (nature.scot)*

Table 6-174. Estimated adult razorbill Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the St Abb's Head to Fast Castle SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

RAZORBILL	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.01	0.02
Mortality - Autumn migration (BDMPS)	0.00	0.01
Mortality - Winter (BDMPS)	0.00	0.00
Mortality - Spring migration (BDMPS)	0.00	0.01
Annual Project alone mortality* (displacement)	0.01	0.02
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination excl Berwick Bank	6.38	13.99
Percentage point change in annual adult survival rate	0.16%	0.36%
Annual in-combination incl Berwick Bank	14.81	28.56
Percentage point change in annual adult survival rate	0.38%	0.73%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1560. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1561. Change in adult survival rate due to in-combination impacts did exceed 0.02% but, as Project alone mortality was less than 0.2 birds per annum, a PVA was also not required to assess in-combination impacts.

1562. Predicted Project alone and in-combination impacts on razorbill were sufficiently small to not warrant further investigation of population response to impacts (i.e. no PVA was required). Project alone mortality was estimated to be 0.02 birds per annum. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be maintained, in the long term.

1563. Consequently, a conclusion of no AEoSI was reached for the razorbill feature of the St Abb's Head to Fast Castle SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.26.6 Conclusion

1564. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **St Abb's Head to Fast Castle SPA**, from collision and displacement impacts from the **Project alone and in-combination** with other OWFs.

1565. Consequently, a conclusion of **no AEoSI** was reached for the **razorbill** feature of the **St Abb's Head to Fast Castle SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1566. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake and razorbill, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **St Abb's Head to Fast Castle SPA**.

1567. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **St Abb's Head to Fast Castle SPA** was reached.

6.3.27 St Kilda SPA

6.3.27.1 Site Description

1568. The St Kilda SPA was classified on 31 August 1992, with marine extension classified on 25 September 2009, due to its populations of breeding seabirds. The site is approximately 250 km south-west of the Project.

1569. St Kilda is a group of remote Scottish islands lying in the North Atlantic about 70 km west of North Uist in the Outer Hebrides. The islands are steep, with precipitous cliffs reaching 430 m on Hirta and 380 m on Soay and Boreray. The vegetation is strongly influenced by sea spray and the presence of seabirds and livestock. Inland on Hirta, species-poor acidic grassland and sub-maritime heaths occupy extensive areas. The islands provide a strategic nesting locality for seabirds that feed in the rich waters to the west of Scotland. The total population of seabirds exceeds 600,000 individuals, making this one of the largest concentrations in the North Atlantic and the largest in the UK. The boundary of the SPA overlaps with the boundary of St. Kilda SSSI, and the seaward extension extends approximately 4 km into the marine environment to include the seabed, water column and surface.

1570. The site is functionally linked to the Seas off St Kilda SPA, a marine SPA which supports foraging and other maintenance behaviours by seabirds from the St Kilda SPA colony SPA.

6.3.27.2 Conservation Objectives for the SPA

1571. The draft conservation objectives of the St Kilda SPA are to:

- To ensure that the qualifying features of St Kilda SPA and the Seas off St Kilda SPA are in favourable condition and make an appropriate contribution to achieving Favourable Conservation Status.
- To ensure that the integrity of St Kilda SPA and the Seas off St Kilda SPA is restored in the context of environmental changes by meeting objectives 2a, 2b and 2c for each qualifying feature:
    - The populations of qualifying features are viable components of St Kilda SPA and Seas off St Kilda SPA.
    - The distributions of the qualifying features throughout St Kilda SPA and Seas off St Kilda SPA are maintained by avoiding significant disturbance of the species.
    - The supporting habitats and processes relevant to qualifying features and their prey/food resources are maintained, or where appropriate restored, at St Kilda SPA and/or Seas off St Kilda SPA.

6.3.27.3 Qualifying features

1572. The qualifying features of the SPA are presented below in **Table 6-175**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

Table 6-175 Qualifying interests and condition for the St Kilda SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake*	7,830 pairs, 2% of the GB population	420 pairs	Unfavourable Declining	8 June 2016	Red
Great skua	270 pairs, 1.9% of the world biogeographic population	211 pairs	Unfavourable Declining	1 June 2023	Amber
Guillemot*	22,700 individuals, 2% of the GB population	10,303 individuals	Unfavourable Declining	11 June 2016	Amber
Razorbill*	3,810 individuals, 3% of the GB population	820 individuals	Unfavourable Declining	11 June 2016	Amber
Puffin	155,000 pairs, 17.2% of the *F.a.grabae* biogeographic population	98,793 pairs	Unfavourable Declining	1 June 2019	Red
Fulmar*	62,800 pairs, 12% of the GB population	29,186 pairs	Unfavourable Declining	8 June 2016	Amber
European storm-petrel	850 pairs, 1.0% of the GB population	952 pairs	Favourable Maintained	1 June 2021	Amber
Leach's petrel	5,000 pairs, 9.1% of the GB population	n/a	Favourable Maintained	1 June 2021	Red
Manx shearwater*	up to 5,000 pairs, about 1% of the GB population	3,731 pairs	Unfavourable No change	1 June 2021	Amber
Gannet	50,050 pairs, 19.0% of the world biogeographic population	60,290 pairs	Favourable Maintained	19 June 2013	Amber
Seabird assemblage	regularly supports 600,000 seabirds including nationally important populations	n/a	Favourable Maintained	25 May 2003	n/a

1573. St Kilda SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 600,000 seabirds including nationally important populations of the following species: Northern gannet, Atlantic puffin, razorbill, black-legged kittiwake, Manx shearwater, Northern fulmar, common guillemot, great skua, European storm-petrel and Leach's storm-petrel.

1574. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) count data was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-55**).

Figure 6-55. St Kilda SPA qualifying feature population trends from 1981 - 2022 (citation population size shown by red line).

6.3.27.4 Potential for the Project to impact the site's conservation objectives

1575. The St Kilda SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **razorbill** qualifying feature, during the non-breeding season;
- Displacement impacts from the offshore Project during operation on the **puffin** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Negative impacts from artificial lighting at the offshore Project during operation on the **European storm petrel** qualifying feature, during the breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **gannet** qualifying feature, during the breeding and non-breeding season;
- Collision impacts from the offshore Project during operation on the **great skua** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Negative impacts from artificial lighting at the offshore Project during operation on the **Manx shearwater** qualifying feature, during the breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

1576. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

1577. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

1578. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.27.5 *Assessment of predicted impacts for Project alone and in-combination*

6.3.27.5.1 Manx shearwater

1579. Negative impacts from artificial lighting on offshore Project infrastructure and vessels during construction, operation and maintenance and decommissioning were assessed for Manx shearwater at St Kilda SPA in **Section 6.1.3** and **Section 6.2.4.**

1580. A conclusion of no AEoSI was reached for the Manx shearwater feature of the St Kilda SPA, from negative impacts from artificial lighting from the Project alone and in-combination with other OWFs.

6.3.27.5.2 European storm petrel

1581. Negative impacts from artificial lighting on offshore Project infrastructure and vessels during construction, operation and maintenance and decommissioning were assessed for European storm petrel at St Kilda SPA in **Section 6.1.3** and **Section 6.2.4.**

1582. A conclusion of no AEoSI was reached for the European storm petrel feature of the St Kilda SPA, from negative impacts from artificial lighting from the Project alone and in-combination with other OWFs.

6.3.27.5.3 Kittiwake

1583. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the St Kilda SPA population is presented in **Table 6-176**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-176. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the St Kilda SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate. Note that zero values from the Project alone in each season are due to rounding. Estimated impacts were smaller than the shown level of precision.*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Autumn migration (BDMPS)	0.00	0.00	0.00	0.00
Mortality - Spring migration (BDMPS)	0.00	0.00	0.00	0.00
Annual Project alone mortality (collision + displacement)*	0.00		0.00	
Percentage point change in annual adult survival rate	<0.01%		<0.01%	
Annual in-combination mortality excl. Berwick Bank	0.05		0.05	

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Percentage point change in annual adult survival rate		0.01%		0.01%
Annual in-combination mortality incl. Berwick Bank		0.05		0.06
Percentage point change in annual adult survival rate		0.01%		0.01%

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.*

1584. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1585. Change in adult survival rate due to in-combination impacts did not exceed 0.02% and, as Project alone mortality was less than 0.2 birds per annum, a PVA was also not required to assess in-combination impacts.

1586. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be maintained.

1587. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the St Kilda SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.27.5.4 Great skua

1588. Predicted great skua collision mortality, by season, and change to annual adult survival rate apportioned to the St Kilda SPA population is presented in **Table 6-177**. In-combination impacts from other OWFs apportioned no great skua mortality to this SPA, so no further assessment of in-combination impacts is required. This was discussed and agreed with NatureScot (consultation meeting, 11 June 2024).

Table 6-177. Estimated adult great skua Project alone collision seasonal and annual mortalities (birds per annum) apportioned to the St Kilda SPA and change in baseline annual adult survival rate.

***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate. Note that zero values from the Project alone in each season are due to rounding. Estimated impacts were smaller than the shown level of precision.*

GREAT SKUA	Collision (WCS)
Mortality - Breeding season (NatureScot)	0.00
Mortality - Non-breeding season (NatureScot)	0.00
Mortality - Autumn migration (BDMPS)	0.00
Mortality - Winter (BDMPS)	0.00
Mortality - Spring migration (BDMPS)	0.00
Annual Project alone mortality* (collision)	0.00
Percentage point change in annual adult survival rate	<0.01%

** Sum of collision mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1589. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. In-combination impacts from other OWFs were zero.

1590. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be restored in the long-term.

1591. Consequently, a conclusion of no AEoSI was reached for the great skua feature of the St Kilda SPA, from collision impacts from the Project alone and in-combination with other OWFs.

6.3.27.5.5 Razorbill

1592. Predicted razorbill displacement mortality, by season, and change to annual adult survival rate apportioned to the St Kilda SPA population is presented in **Table 6-178**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-178. Estimated adult razorbill Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the St Kilda SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate****. Note that zero values from the Project alone in each season are due to rounding. Estimated impacts were smaller than the shown level of precision.***

RAZORBILL	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.00	0.00
Mortality - Autumn migration (BDMPS)	0.00	0.00
Mortality - Winter (BDMPS)	0.00	0.00
Mortality - Spring migration (BDMPS)	0.00	0.00
Annual Project alone mortality* (displacement)	0.00	0.00
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination excl Berwick Bank	0.29	0.91
Percentage point change in annual adult survival rate	0.03%	0.08%
Annual in-combination incl Berwick Bank	0.32	0.98

RAZORBILL	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Percentage point change in annual adult survival rate	0.03%	0.09%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.*

1593. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1594. Change in adult survival rate due to in-combination impacts did exceed 0.02% but, as Project alone mortality was less than 0.2 birds per annum, a PVA was also not required to assess in-combination impacts.

1595. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be restored.

1596. Consequently, a conclusion of no AEoSI was reached for the razorbill feature of the St Kilda SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.27.5.6 Puffin

1597. Predicted puffin displacement mortality, by season, and change to annual adult survival rate apportioned to the St Kilda SPA population is presented in **Table 6-179**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

1598. Note, almost all breeding season Project alone puffin mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-179. Estimated adult puffin Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the St Kilda SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

PUFFIN	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.02	0.05
Mortality - Non-breeding season (BDMPS)	0.02	0.05
Annual Project alone mortality* (displacement)	0.02	0.05

PUFFIN	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination mortality excl Berwick Bank	16.52	27.79
Percentage point change in annual adult survival rate	0.01%	0.01%
Annual in-combination mortality incl Berwick Bank	16.59	27.99
Percentage point change in annual adult survival rate	0.01%	0.01%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1599. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1600. Change in adult survival rate due to in-combination impacts did not exceed 0.02% and, as Project alone mortality was less than 0.2 birds per annum, a PVA was also not required to assess in-combination impacts.

1601. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be restored.

1602. Consequently, a conclusion of no AEoSI was reached for the puffin feature of the St Kilda SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.27.5.7 Fulmar

1603. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the St Kilda SPA population is presented in **Table 6-180**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features

Table 6-180. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities (birds per annum) apportioned to the St Kilda SPA and change in baseline annual adult survival rate

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.012	0.036
Mortality - Non-breeding season (NatureScot)	0.132	0.397
Mortality - Autumn migration (BDMPS)	0.000	0.000
Mortality - Winter (BDMPS)	0.132	0.397
Mortality - Spring migration (BDMPS)	0.000	0.000
Annual Project alone mortality* (displacement)	0.144	0.433

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Percentage point change in annual adult survival rate	0.000%	0.001%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1604. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination assessment was undertaken for fulmar.

1605. The Project alone impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be restored.

1606. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the St Kilda SPA, from displacement impacts from the Project alone.

6.3.27.5.8 Gannet

1607. Predicted gannet collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the St Kilda SPA population is presented in **Table 6-181**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

1608. Note, almost all breeding season Project alone gannet mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-181. Estimated adult gannet Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the St Kilda SPA and change in baseline annual adult survival rate.

***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

GANNET	Collision (WCS)	Low Displacement (70%/1%)	Collision (WCS)	High Displacement (70%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.21	0.25	0.21	0.75
Mortality - Autumn migration (BDMPS)	0.21	0.25	0.21	0.75
Mortality - Spring migration (BDMPS)	0.00	0.00	0.00	0.00
Annual Project alone mortality (collision + displacement)*	0.46		0.96	
Percentage point change in annual adult survival rate	<0.01%		<0.01%	

GANNET	Collision (WCS)	Low Displacement (70%/1%)	Collision (WCS)	High Displacement (70%/3%)
Annual in-combination excl Berwick Bank		33.49		46.3
Percentage point change in annual adult survival rate		0.03%		0.04%
Annual in-combination incl Berwick Bank		34.71		47.53
Percentage point change in annual adult survival rate		0.03%		0.04%

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1609. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1610. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

1611. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

1612. **Table 6-182** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the gannet population at St Kilda SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-182. St. Kilda SPA: Gannet PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	0.5	0.000003809366	25	1.0000	1.0000	0.0002	0.9995	1.0004	0.9996	0.9997	0.0061	0.9880	1.0117	49.9	50.0
Project alone CRM+High	1.0	0.000007960169	25	1.0000	1.0000	0.0002	0.9995	1.0004	0.9995	0.9995	0.0060	0.9875	1.0116	50.3	49.8
Incomb CRM+Low ex. BB	33.5	0.000277733131	25	0.9997	0.9997	0.0002	0.9992	1.0001	0.9916	0.9914	0.0060	0.9788	1.0033	47.9	51.8
Incomb CRM+High ex. BB	46.3	0.000384009524	25	0.9996	0.9995	0.0002	0.9991	1.0000	0.9885	0.9883	0.0063	0.9759	1.0015	47.1	53.2
Incomb CRM+Low inc. BB	34.7	0.000287894920	25	0.9997	0.9997	0.0002	0.9992	1.0001	0.9912	0.9914	0.0058	0.9807	1.0028	48.1	51.9
Incomb CRM+High inc. BB	47.5	0.000394171313	25	0.9995	0.9995	0.0002	0.9991	1.0000	0.9880	0.9879	0.0060	0.9758	0.9996	47.2	53.4
Project alone CRM+Low	0.5	0.000003809366	35	1.0000	1.0000	0.0002	0.9996	1.0004	0.9995	0.9996	0.0070	0.9862	1.0131	50.1	49.7
Project alone CRM+High	1.0	0.000007960169	35	1.0000	1.0000	0.0002	0.9996	1.0004	0.9994	0.9993	0.0070	0.9856	1.0138	50.0	49.9
Incomb CRM+Low ex. BB	33.5	0.000277733131	35	0.9997	0.9997	0.0002	0.9993	1.0001	0.9881	0.9881	0.0068	0.9753	1.0017	47.9	51.8
Incomb CRM+High ex. BB	46.3	0.000384009524	35	0.9995	0.9995	0.0002	0.9992	0.9999	0.9839	0.9838	0.0072	0.9706	0.9989	46.4	53.1
Incomb CRM+Low inc. BB	34.7	0.000287894920	35	0.9997	0.9997	0.0002	0.9993	1.0000	0.9877	0.9879	0.0068	0.9750	1.0019	48.3	52.4
Incomb CRM+High inc. BB	47.5	0.000394171313	35	0.9995	0.9995	0.0002	0.9992	0.9999	0.9830	0.9832	0.0069	0.9699	0.9975	46.8	52.7
Project alone CRM+Low	0.5	0.000003809366	50	1.0000	1.0000	0.0002	0.9997	1.0003	0.9995	0.9994	0.0078	0.9837	1.0137	50.0	50.0
Project alone CRM+High	1.0	0.000007960169	50	1.0000	1.0000	0.0001	0.9997	1.0003	0.9990	0.9992	0.0077	0.9844	1.0151	50.4	49.8
Incomb CRM+Low ex. BB	33.5	0.000277733131	50	0.9998	0.9998	0.0002	0.9995	1.0001	0.9879	0.9879	0.0077	0.9730	1.0032	48.0	52.4
Incomb CRM+High ex. BB	46.3	0.000384009524	50	0.9997	0.9997	0.0002	0.9994	1.0000	0.9835	0.9836	0.0080	0.9677	0.9988	48.0	53.4
Incomb CRM+Low inc. BB	34.7	0.000287894920	50	0.9998	0.9998	0.0001	0.9995	1.0001	0.9876	0.9877	0.0076	0.9738	1.0027	48.0	52.5
Incomb CRM+High inc. BB	47.5	0.000394171313	50	0.9997	0.9997	0.0002	0.9994	1.0000	0.9828	0.9830	0.0077	0.9683	0.9978	46.9	53.7

1613. Predicted Project alone impacts on the gannet population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

1614. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9995 (95% c.i. 0.9992-0.9999) (**Table 6-182**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.05%. This very small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the gannet population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Additionally, the Project contributed a mortality of <1 bird per annum to the in-combination total of 48 birds per annum (including Berwick Bank impacts, worst case scenario).

1615. The gannet feature condition was Favourable Maintained, when last assessed in June 2013 and was above citation population size when last counted. The St Kilda SPA colony, unlike all other gannet populations in the UK and the Republic of Ireland, remained stable between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). Gannet populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The St Kilda SPA gannet population was not counted in 2023 so any change in population size due to HPAI is unknown. Most gannet colonies showed a substantial decline, when counted in 2023, and so it is likely that this population has also declined recently.

1616. The gannet population at St Kilda SPA, when last counted, was above citation population size and feature condition is Favourable Maintained. As the Project alone and in-combination impacts on this population are predicted to be very small they will not exacerbate any future declines which may occur and will not prevent or reduce the potential for this population to be maintained.

1617. Consequently, a conclusion of no AEoSI was reached for the gannet feature of the St Kilda SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.27.6 *Conclusion*

1618. A conclusion of **no AEoSI** was reached for the **European storm petrel** feature of the **St Kilda SPA**, from negative impacts from artificial lighting from the **Project alone and in-combination** with other OWFs.

1619. A conclusion of **no AEoSI** was reached for the **Manx shearwater** feature of the **St Kilda SPA,** from negative impacts from artificial lighting from the **Project alone and in-combination** with other OWFs.

1620. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **St Kilda SPA,** from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1621. A conclusion of **no AEoSI** was reached for the **great skua** feature of the **St Kilda SPA**, from collision impacts from the **Project alone** and **in-combination** with other OWFs.

1622. A conclusion of **no AEoSI** was reached for the **razorbill** feature of the **St Kilda SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1623. A conclusion of **no AEoSI** was reached for the **puffin** feature of the **St Kilda SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1624. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **St Kilda SPA**, from displacement and barrier impacts from the **Project alone**. No in-combination assessment was undertaken.

1625. A conclusion of **no AEoSI** was reached for the **gannet** feature of the **St Kilda SPA,** from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1626. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, great skua, razorbill, puffin, fulmar, Manx shearwater and European storm petrel, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **St Kilda SPA**.

1627. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **St Kilda SPA** was reached.

6.3.28 Sule Skerry and Sule Stack SPA

6.3.28.1 Site Description

1628. The Sule Skerry and Sule Stack SPA was classified on 31 August 1992, with marine extension classified on 25 September 2009, due to its populations of breeding seabirds. The SPA boundary (which includes a 2 km marine extension) is 1.7 km from the north west edge of the OAA boundary, at its closest point.

1629. Sule Skerry and Sule Stack are isolated islets 60 km west of Mainland, Orkney. Sule Skerry is larger, low-lying and vegetated whereas Sule Stack is a higher, bare rock stack with no vascular plants.

1630. The boundary of the SPA overlaps with those of Sule Skerry SSSI and Sule Stack SSSI and the seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface.

6.3.28.2 Conservation Objectives for the SPA

1631. The conservation objectives of the Sule Skerry and Sule Stack SPA are:

- 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
- 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.

6.3.28.3 Qualifying features

1632. The qualifying features of the SPA are presented below in **Table 6-183**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

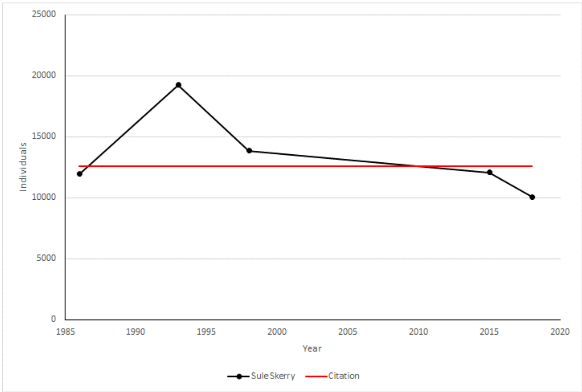
Table 6-183 Qualifying interests and condition for the Sule Skerry and Sule Stack SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Guillemot	6,298 pairs, 0.9% of the GB population	9,000 individuals	Favourable Maintained	10 July 2015	Amber

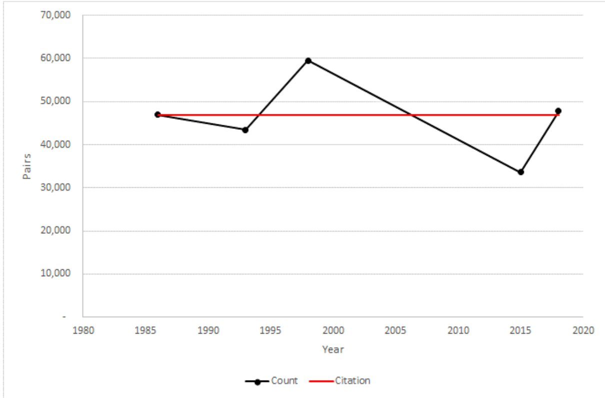
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Puffin	46,900 pairs, 5% of the *F.a.grabae* biogeographic population	47,742 pairs	Favourable Maintained	1 June 2018	Red
Gannet	5,900 pairs, 2.2% of the world biogeographic population	9,065 pairs	Favourable Maintained	1 June 2018	Amber
European storm-petrel	500 - 5000 pairs, 1 - 6% of the GB population	177 (121 to 235) pairs	Unfavourable Declining	1 June 2021	Amber
Leach's petrel	5 pairs, <0.1% of the GB population	n/a	Unfavourable No change	1 June 2021	Red
Shag*	874 pairs, 2.3% of the GB population	26 pairs	Unfavourable Declining	1 June 2018	Red
Seabird assemblage	regularly supports 100,000 seabirds including nationally important populations	n/a	Favourable Maintained	10 July 2015	n/a

1633. Sule Skerry and Sule Stack SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 100,000 seabirds including nationally important populations of the following species: Atlantic puffin, common guillemot, European shag, Northern gannet, European storm-petrel and Leach's storm-petrel.

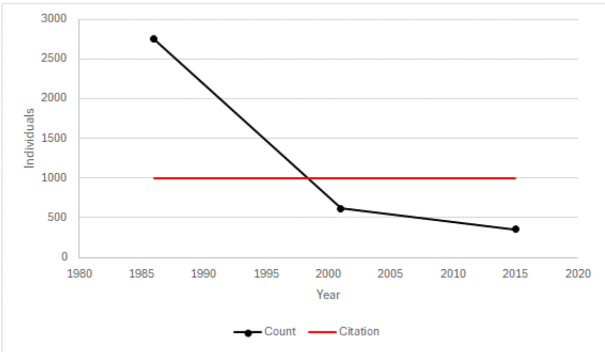
1634. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) count data was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-56**).



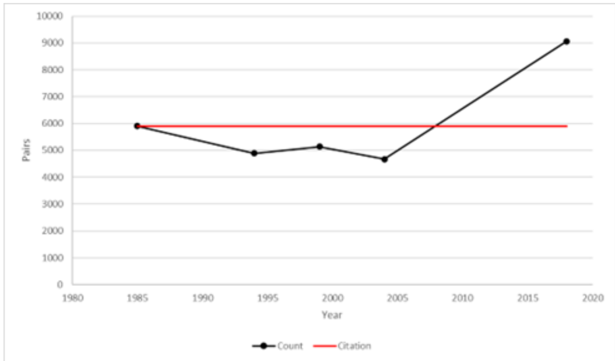
Guillemot



Puffin



Storm petrel



Gannet

Figure 6-56. Sule Skerry and Sule Stack SPA qualifying feature population trends from 1981 - 2022 (citation population size shown by red line).

6.3.28.4 *Potential for the Project to impact the site's conservation objectives*

1635. The Sule Skerry and Sule Stack SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **guillemot** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **puffin** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **gannet** qualifying feature, during the breeding and non-breeding season;
- Negative impacts from artificial lighting at the offshore Project during operation on the **European storm petrel** qualifying feature, during the breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

1636. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

1637. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

1638. The site is adjacent to the offshore Project area, with the SPA boundary just 1.7 km from the OAA boundary. However, there is no potential for the Project to undermine any of the other conservation objectives for this site as the Project would not change the distribution of the species within the site, including within the marine extension, nor affect habitats within the site. The Restricted Build Areas (RBA) mean that no WTGs will be installed in the part of the OAA closest to the Sule Skerry and Sule Stack SPA. This further ensures that no other conservation objectives of the site are potential undermined by the Project.

6.3.28.5 *Assessment of predicted impacts for Project alone and in-combination*

6.3.28.5.1 European storm petrel

1639. Negative impacts from artificial lighting on offshore Project infrastructure and vessels during construction, operation and maintenance and decommissioning were assessed for European storm petrel at Sule Skerry and Sule Stack SPA in **Section 6.1.3** and **Section 6.2.4.** Overall, the risk of negative impacts of lighting were considered to be very low. Consequently, a conclusion of **no AEoSI** was reached for negative impacts of lighting on **European storm petrel** at **Sule Skerry and Sule Stack SPA,** for both **Project alone** and **in-combination** impacts.

6.3.28.5.2 Guillemot

1640. Predicted guillemot displacement mortality, by season, and change to annual adult survival rate apportioned to the Sule Skerry and Sule Stack SPA population is presented in **Table 6-184.** NatureScot requested two in-combination scenarios to be presented, one including Berwick Bank Wind Farm impacts and the other without Berwick Bank Wind Farm impacts (letter from NatureScot to the Project, dated 3 June 2024). However, Berwick Bank Wind Farm did not have connectivity with any of the SPAs with guillemot features, potentially impacted by the Project and so the in-combination assessment does not include any Berwick Bank Wind Farm impacts.

1641. Note, almost all breeding season Project alone guillemot mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-184. Estimated adult guillemot Project alone and in-combination displacement seasonal and annual mortalities apportioned to the Sule Skerry and Sule Stack SPA and change in baseline annual adult survival rate.

***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

GUILLEMOT	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	76.05	126.75
Mortality - Non-breeding season (NatureScot)	0.34	1.03
Mortality - Non-breeding season (BDMPS)	0.34	1.03
Annual Project alone mortality (displacement)*	76.39	127.78
Percentage point change in annual adult survival rate	0.633%	1.060%
Annual in-combination mortality	81.00	140.72
Percentage point change in annual adult survival rate	0.672%	1.167%

* Sum of displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations

1642. As change in adult survival rate from the Project alone impacts exceeded the 0.02% threshold, a PVA was required for Project alone impacts.

1643. Change in adult survival rate due to in-combination impacts exceeded the 0.02% threshold and as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

1644. **Table 6-185** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the guillemot population at Sule Skerry and Sule Stack SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1645. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-185. Sule Skerry and Sule Stack SPA: Guillemot PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	76.4	0.006334	25	0.9930	0.9930	0.0006	0.9918	0.9942	0.8320	0.8330	0.0132	0.8068	0.8603	15.6	85.0
Project alone High	127.8	0.010595	25	0.9883	0.9883	0.0006	0.9871	0.9894	0.7360	0.7359	0.0117	0.7119	0.7600	4.1	97.1
Incomb Low	81.0	0.006717	25	0.9926	0.9926	0.0006	0.9914	0.9937	0.8242	0.8237	0.0126	0.7988	0.8473	13.3	86.8
Incomb High	140.7	0.011669	25	0.9871	0.9871	0.0006	0.9858	0.9882	0.7132	0.7131	0.0113	0.6895	0.7355	3.1	98.2
Project alone Low	76.4	0.006334	35	0.9930	0.9930	0.0005	0.9920	0.9939	0.7765	0.7761	0.0138	0.7507	0.8025	10.0	88.7
Project alone High	127.8	0.010595	35	0.9883	0.9882	0.0005	0.9873	0.9891	0.6536	0.6534	0.0118	0.6312	0.6764	2.3	98.5
Incomb Low	81.0	0.006717	35	0.9926	0.9925	0.0005	0.9916	0.9934	0.7647	0.7641	0.0135	0.7369	0.7897	8.6	90.6
Incomb High	140.7	0.011669	35	0.9870	0.9871	0.0005	0.9860	0.9880	0.6254	0.6257	0.0114	0.6015	0.6478	1.5	99.4
Project alone Low	76.4	0.006334	50	0.9950	0.9950	0.0004	0.9942	0.9958	0.7749	0.7750	0.0156	0.7431	0.8044	14.2	84.9
Project alone High	127.8	0.010595	50	0.9916	0.9916	0.0004	0.9909	0.9924	0.6523	0.6520	0.0134	0.6263	0.6774	4.7	94.9
Incomb Low	81.0	0.006717	50	0.9947	0.9947	0.0004	0.9939	0.9954	0.7631	0.7629	0.0152	0.7327	0.7903	13.2	86.3
Incomb High	140.7	0.011669	50	0.9908	0.9908	0.0004	0.9900	0.9916	0.6239	0.6242	0.0132	0.5987	0.6504	3.0	96.4

1646. The C-PGR for Project alone impacts after 35 years for the highest impact scenario of high displacement was 0.9882 (95% c.i. 0.9873-0.9891) (**Table 6-185**). The predicted reduction in population growth rate under this highest impact worst case scenario was 1.18%.

1647. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, was 0.9871 (95% c.i. 0.9860-0.9880) (**Table 6-185**). The predicted reduction in population growth rate under this highest impact worst case scenario was 1.29%.

1648. The Project contributed a mortality of 128 birds per annum to the in-combination total of 141 birds per annum.

1649. This predicted change to population growth rate, under both Project alone and in-combination impacts, indicates that the guillemot population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these Project alone and in-combination impacts.

1650. Guillemot Project alone and in-combination impacts were predicted to reduce population growth rate by up 1.2% and 1.3%, respectively. Annual displacement mortality from the Project alone was estimated to be 128 birds per annum. This assessment suggests the Project impacts, alone and in-combination with other OWFs, has the potential to reduce population growth rate to a small extent, compared with predicted growth rate in the absence of any impacts.

1651. Note, the assessment was based on displacement of the mean seasonal peak abundance within the OAA plus 2 km buffer, making no adjustment for the RBAs. If abundance of birds within the RBAs was removed from the mean seasonal peak estimate, predicted displacement mortality would be lower. Consequently, predicted impacts on the guillemot population would have been smaller if the RBAs had been taken into account.

1652. The assessment was based on an assumed guillemot displacement rate of 60%, with 5% of displaced birds dying in the breeding season and 3% in the non-breeding season, under the high impact scenario. However, surveys of bird distribution within and outwith the Beatrice OWF development area prior to and following construction and operation of the OWF, have shown no compelling evidence of displacement of guillemots during the breeding season (Trinder *et al.,* 2024). This OWF is relatively close to the Project (approximately 90 km away) and is a similar distance from the coast where colonies of guillemots are breeding, i.e. the ecological conditions under which guillemots are using the Beatrice OWF and the Project are very similar. Evidence of guillemots being displaced from OWFs comes from studies from much further away than Beatrice (Peschko *et al.,* 2020; Peschko *et al.,* 2024). Consequently, it would be reasonable to assume that the proportion of guillemots that would be displaced from the Project during the breeding season would be much lower than the assumed 60%. This would mean that mortality on the Sule Skerry and Sule Stack SPA guillemot feature would be considerably less than predicted by this assessment.

1653. The guillemot population at this SPA has maintained a population size similar to citation population size and feature condition is Favourable Maintained. However, condition was last assessed in July 2015 and population size decreased by 21% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). Guillemot populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). This Sule Skerry and Sule Stack SPA guillemot population was not counted in 2023 so any change in population size due to HPAI is unknown. Four other nearby colonies, which were counted in 2023, showed marked differences in their populations, with an increase at North Caithness Cliffs (33%) and Cape Wrath (64%) but a decline at Marwick Head (20%) and at Copinsay (56%) (Tremlett *et al.*, 2024). Consequently, it is very difficult to predict whether the Sule Skerry and Sule Stack SPA guillemot population has remained stable or decreased due to HPAI impacts.

1654. Whilst evidence suggests the guillemot population at Sule Skerry and Sule Stack SPA to be relatively stable, the predicted reductions in growth rate in the presence of Project alone and in-combination impacts could be sufficient to reduce population size to a small extent, in the long-term.

1655. Therefore, it was not possible to conclude no AEoSI for the guillemot feature of the Sule Skerry and Sule Stack SPA, from displacement impacts from the Project alone and in-combination impacts, which may have the potential to undermine the conservation objective: To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

6.3.28.5.3 Puffin

1656. The puffin feature at Sule Skerry and Sule Stack SPA was screened in for negative impacts of artificial lighting from the Project, during construction, operation and maintenance and decommissioning. There is evidence that puffin fledglings, on emerging from their nest burrow and taking their first flight to the sea, can be attracted to artificial lighting (see **Section 6.1.3** and **Section 6.2.4** for details of the assessment). However, this impact was found to not undermine the site's conservation objectives due to the temporary nature and small spatial scale

1657. Predicted puffin displacement mortality, by season, and change to annual adult survival rate apportioned to the Sule Skerry and Sule Stack SPA population is presented in **Table 6-186**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

1658. Note, almost all breeding season Project alone puffin mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-186. Estimated adult puffin Project alone and in-combination displacement seasonal and annual mortalities apportioned to the Sule Skerry and Sule Stack SPA and change in baseline annual adult survival rate.

See ***Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts*** *for more details on calculation of mortalities and changes to survival rate.*

PUFFIN	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	48.53	80.90
Mortality - Non-breeding season (NatureScot)	0.01	0.02
Mortality - Non-breeding season (BDMPS)	0.00	0.00
Annual Project alone*	48.54	80.92
Percentage point change in annual adult survival rate	0.05%	0.085%
Annual in-combination mortality excl Berwick Bank	48.62	81.14
Percentage point change in annual adult survival rate	0.05%	0.08%
Annual in-combination mortality incl Berwick Bank	48.65	81.22
Percentage point change in annual adult survival rate	0.05%	0.08%

** Sum of displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1659. As change in adult survival rate from the Project alone impacts exceeded the 0.02% threshold, a PVA was required for Project alone impacts.

1660. Change in adult survival rate due to in-combination impacts also exceeded the 0.02% threshold and as Project alone mortality was more than 0.2 birds per annum, a PVA was also required to assess in-combination impacts.

1661. **Table 6-187** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the puffin population at Sule Skerry and Sule Stack SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1662. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse

effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-187. Sule Skerry and Sule Stack SPA: Puffin PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	48.5	0.0005084074	25	0.9994	0.9994	0.0004	0.9985	1.0004	0.9849	0.9849	0.0113	0.9630	1.0080	48.8	51.3
Project alone High	80.9	0.0008474375	25	0.9990	0.9990	0.0004	0.9981	0.9998	0.9745	0.9745	0.0112	0.9528	0.9969	47.1	52.1
Incomb Low ex. BB	48.6	0.0005091712	25	0.9994	0.9994	0.0004	0.9985	1.0002	0.9852	0.9848	0.0115	0.9620	1.0073	48.6	51.4
Incomb High ex. BB	81.1	0.0008497289	25	0.9990	0.9990	0.0004	0.9982	0.9999	0.9751	0.9747	0.0113	0.9528	0.9977	47.2	52.1
Incomb Low inc. BB	48.6	0.0005094578	25	0.9994	0.9994	0.0004	0.9986	1.0003	0.9846	0.9847	0.0113	0.9622	1.0084	48.1	51.4
Incomb High inc. BB	81.2	0.0008505885	25	0.9990	0.9990	0.0004	0.9981	0.9999	0.9749	0.9749	0.0114	0.9507	0.9976	47.0	52.2
Project alone Low	48.5	0.0005084074	35	0.9994	0.9994	0.0004	0.9986	1.0003	0.9792	0.9792	0.0152	0.9489	1.0085	48.0	51.7
Project alone High	80.9	0.0008474375	35	0.9990	0.9990	0.0004	0.9982	0.9999	0.9645	0.9650	0.0148	0.9385	0.9958	46.5	52.2
Incomb Low ex. BB	48.6	0.0005091712	35	0.9994	0.9994	0.0004	0.9986	1.0002	0.9788	0.9787	0.0153	0.9504	1.0100	48.1	51.4
Incomb High ex. BB	81.1	0.0008497289	35	0.9990	0.9990	0.0004	0.9981	0.9998	0.9651	0.9649	0.0150	0.9355	0.9941	46.5	52.4
Incomb Low inc. BB	48.6	0.0005094578	35	0.9994	0.9994	0.0004	0.9986	1.0003	0.9791	0.9789	0.0156	0.9488	1.0103	48.3	51.9
Incomb High inc. BB	81.2	0.0008505885	35	0.9990	0.9990	0.0004	0.9982	0.9998	0.9657	0.9653	0.0148	0.9339	0.9951	46.3	52.4
Project alone Low	48.5	0.0005084074	50	0.9996	0.9996	0.0004	0.9987	1.0005	0.9784	0.9793	0.0225	0.9373	1.0237	48.4	52.0
Project alone High	80.9	0.0008474375	50	0.9993	0.9993	0.0005	0.9984	1.0002	0.9645	0.9655	0.0226	0.9237	1.0083	47.6	52.7
Incomb Low ex. BB	48.6	0.0005091712	50	0.9996	0.9996	0.0005	0.9987	1.0005	0.9777	0.9788	0.0234	0.9324	1.0281	48.0	51.8
Incomb High ex. BB	81.1	0.0008497289	50	0.9993	0.9993	0.0005	0.9983	1.0002	0.9637	0.9645	0.0231	0.9167	1.0119	47.2	52.3
Incomb Low inc. BB	48.6	0.0005094578	50	0.9996	0.9996	0.0005	0.9987	1.0005	0.9778	0.9792	0.0234	0.9323	1.0262	48.0	51.5
Incomb High inc. BB	81.2	0.0008505885	50	0.9993	0.9993	0.0005	0.9984	1.0002	0.9650	0.9650	0.0222	0.9226	1.0119	47.6	52.5

1663. The C-PGR for Project alone impacts after 35 years for the highest impact scenario of high displacement was 0.9990 (95% c.i. 0.9982-0.9999) (**Table 6-187**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.1%.

1664. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, including Berwick Bank Wind Farm impacts, was 0.9990 (95% c.i. 0.9982-0.9998) (**Table 6-187**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.1%.

1665. The Project contributed a mortality of 80.9 birds per annum to the in-combination total of 81.2 birds per annum (including Berwick Bank Wind Farm impacts, worst case scenario).

1666. Population response to Project alone and in-combination impacts was very similar as there was virtually no additional in-combination puffin mortality from other OWFs apportioned to this SPA. This small change in population growth rate, under both Project alone and in-combination impacts, indicates that the PVA trajectories with impacts are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the puffin population will be of a similar size after 35 years, in the presence of Project impacts alone and in-combination with impacts from other OWF, as would be expected in the absence of these impacts.

1667. Note, the assessment was based on displacement of the mean seasonal peak abundance within the OAA plus 2 km buffer, making no adjustment for the RBAs. If abundance of birds within the RBAs was removed from the mean seasonal peak estimate, predicted displacement mortality would be lower. Consequently, predicted impacts on the puffin population would have been smaller if the RBAs had been taken into account. During May to August, puffins were often concentrated in the north-west of the OAA plus 4 km buffer, in the direction of Sule Skerry and Sule Stack SPA (see **Appendix 1 - EIA and HRA: Baseline Site Characterisation Technical Report**, **Section 4.2.8.3** for maps of raw observations of puffins on each of the 27 digital aerial surveys).

1668. The puffin population at this SPA has maintained a relatively stable population size and feature condition is Favourable Maintained, as assessed in June 2018. Population size decreased by 20% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). However, obtaining reliable estimates of puffin population size is very difficult, due to this species nesting in burrows and counts have wide uncertainty around them (Burnell *et al.*, 2023).

1669. Puffin populations are thought to have not been heavily impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). Consequently, no counts to assess HPAI impacts were undertaken for puffin in 2023.

1670. The puffin population at Sule Skerry and Sule Stack SPA appears to be stable and that Project alone and in-combination impacts are predicted to change population growth rate to a sufficient small extent that population size would not be expected to be substantially smaller in the presence of impacts, compared to what would be expected without impacts.

Consequently, a conclusion of no AEoSI was reached for the puffin feature of the Sule Skerry and Sule Stack SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.28.5.4 Gannet

1671. Predicted gannet collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Sule Skerry and Sule Stack SPA population is presented in **Table 6-188**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

1672. Note, almost all breeding season Project alone gannet mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-188. Estimated adult gannet Project alone and in-combination collision and displacement seasonal and annual mortalities apportioned to the Sule Skerry and Sule Stack SPA and change in baseline annual adult survival rate.

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

GANNET	Collision (WCS)	Low Displacement (70%/1%)	Collision (WCS)	High Displacement (70%/3%)
Mortality - Breeding season (NatureScot)	17.47	2.95	17.47	8.85
Mortality - Non-breeding season (NatureScot)	0.02	0.02	0.02	0.06
Mortality - Autumn migration (BDMPS)	0.02	0.02	0.02	0.06
Mortality - Spring migration (BDMPS)	0.00	0.00	0.00	0.00
Annual Project alone mortality (collision + displacement)*	20.46		26.40	
Percentage point change in annual adult survival rate	0.11%		0.15%	
Annual in-combination mortality excl. Berwick Bank	32.55		42.14	
Percentage point change in annual adult survival rate	0.18%		0.23%	
Annual in-combination mortality incl. Berwick Bank	32.80		42.39	
Percentage point change in annual adult survival rate	0.18%		0.23%	

** Sum of collision plus displacement mortality for NatureScot breeding season and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.*

1673. As change in adult survival rate from the Project alone impacts exceeded the 0.02% threshold, a PVA was required for Project alone impacts.

1674. Change in adult survival rate due to in-combination impacts also exceeded the 0.02% threshold and as Project alone mortality was more than 0.2 birds per annum, a PVA was also required to assess in-combination impacts.

1675. **Table 6-189** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the gannet population at Sule Skerry and Sule Stack SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1676. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-189. Sule Skerry and Sule Stack SPA: Gannet PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	20.5	0.001128273	25	0.9987	0.9987	0.0006	0.9975	0.9999	0.9675	0.9670	0.0156	0.9367	0.9975	41.8	58.8
Project alone CRM+High	26.4	0.001455989	25	0.9983	0.9983	0.0006	0.9971	0.9994	0.9571	0.9568	0.0151	0.9266	0.9865	39.3	60.4
Incomb CRM+Low ex. BB	32.6	0.001795611	25	0.9979	0.9979	0.0006	0.9967	0.9990	0.9479	0.9477	0.0152	0.9175	0.9771	38.6	61.9
Incomb CRM+High ex. BB	42.1	0.002324584	25	0.9973	0.9973	0.0006	0.9961	0.9984	0.9329	0.9324	0.0148	0.9017	0.9620	34.6	65.5
Incomb CRM+Low inc. BB	32.8	0.001808993	25	0.9979	0.9979	0.0006	0.9968	0.9990	0.9473	0.9471	0.0151	0.9188	0.9773	38.2	63.0
Incomb CRM+High inc. BB	42.4	0.002337966	25	0.9973	0.9973	0.0006	0.9961	0.9985	0.9315	0.9319	0.0148	0.9027	0.9605	35.0	66.0
Project alone CRM+Low	20.5	0.001128273	35	0.9987	0.9987	0.0005	0.9977	0.9997	0.9544	0.9547	0.0176	0.9216	0.9906	40.1	60.1
Project alone CRM+High	26.4	0.001455989	35	0.9983	0.9983	0.0005	0.9973	0.9992	0.9400	0.9405	0.0172	0.9061	0.9734	37.0	62.2
Incomb CRM+Low ex. BB	32.6	0.001795611	35	0.9979	0.9979	0.0005	0.9969	0.9989	0.9278	0.9282	0.0172	0.8926	0.9614	35.7	63.4
Incomb CRM+High ex. BB	42.1	0.002324584	35	0.9973	0.9973	0.0005	0.9963	0.9982	0.9085	0.9078	0.0165	0.8743	0.9391	31.8	67.6
Incomb CRM+Low inc. BB	32.8	0.001808993	35	0.9979	0.9979	0.0005	0.9969	0.9989	0.9269	0.9274	0.0171	0.8959	0.9608	35.7	63.9
Incomb CRM+High inc. BB	42.4	0.002337966	35	0.9973	0.9973	0.0005	0.9963	0.9982	0.9063	0.9065	0.0163	0.8748	0.9401	31.5	67.0
Project alone CRM+Low	20.5	0.001128273	50	0.9991	0.9991	0.0004	0.9983	0.9999	0.9540	0.9542	0.0203	0.9158	0.9937	42.0	58.5
Project alone CRM+High	26.4	0.001455989	50	0.9988	0.9988	0.0004	0.9980	0.9996	0.9400	0.9397	0.0202	0.8994	0.9800	39.3	61.3
Incomb CRM+Low ex. BB	32.6	0.001795611	50	0.9985	0.9985	0.0004	0.9977	0.9993	0.9277	0.9278	0.0195	0.8898	0.9643	37.7	62.4
Incomb CRM+High ex. BB	42.1	0.002324584	50	0.9981	0.9981	0.0004	0.9973	0.9989	0.9082	0.9074	0.0193	0.8693	0.9454	34.5	65.5
Incomb CRM+Low inc. BB	32.8	0.001808993	50	0.9985	0.9985	0.0004	0.9977	0.9993	0.9279	0.9274	0.0197	0.8884	0.9662	37.7	62.1
Incomb CRM+High inc. BB	42.4	0.002337966	50	0.9981	0.9981	0.0004	0.9973	0.9988	0.9054	0.9058	0.0190	0.8692	0.9429	34.2	65.3

1677. The C-PGR for Project alone impacts after 35 years for the highest impact scenario of high displacement and WCS collision was 0.9983 (95% c.i. 0.9973-0.9992) (**Table 6-189**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.17%.

1678. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank Wind Farm impacts, was 0.9973 (95% c.i. 0.9963-0.9982) (**Table 6-189**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.27%.

1679. This small change in population growth rate, under both Project alone and in-combination impacts, indicates that the PVA trajectories with impacts are similar to baseline trajectories with no impacts, i.e. it is likely that the gannet population will be of a similar size after 35 years, in the presence of Project impacts alone and in-combination with impacts from other OWF, as would be expected in the absence of these impacts.

1680. The Project contributed a mortality of 26.4 birds per annum to the in-combination total of 42.4 birds per annum (including Berwick Bank Wind Farm impacts, worst case scenario).

1681. Note, the assessment was based on displacement of the mean seasonal peak abundance within the OAA plus 2 km buffer, making no adjustment for the RBAs. If abundance of gannets within the RBAs was removed from the mean seasonal peak estimate, predicted displacement mortality would be lower. Consequently, predicted impacts on the gannet population would have been smaller if the RBAs had been taken into account. However, approximately two-thirds of predicted mortality arose from collisions and only one-third from displacement. Therefore, an adjustment to allow for no WTGs in the RBAs would only marginally reduce predicted gannet mortality.

1682. The gannet population at this SPA has increased well above the citation population size and feature condition is Favourable Maintained, as assessed in June 2018. Population size at Sule Stack remained relatively constant between the gannet census of 2003-05 and the 2021 count, while Sule Skerry numbers increased from 57 to 11,500 AON/AOS (Apparently Occupied Nest/Site) (Burnell *et al.*, 2023).

1683. Gannet populations are known to have been heavily impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). Sule Skerry and Sule Stack SPA colonies were not counted in 2023 but counts at other colonies showed declines of between 3% and 54% with an average decrease of 25%. The only colony to increase between 2021 and 2023 was Flamborough and Filey Coast (Tremlett *et al.*, 2024). It is therefore likely that the gannet population at Sule Skerry and Sule Stack SPA decreased to some extent due to HPAI impacts but the extent of any decline is unknown.

1684. The gannet population at Sule Skerry and Sule Stack SPA has grown strongly over the last 20 years and, whilst there may have been decreases in population size in response to HPAI, gannets exhibit immunity to the disease (Lane *et al.*, 2023) and the population would be expected to show a rapid recovery. Given this and the small predicted change to population growth rate from Project alone and in-combination impacts, it is highly unlikely that the population would be reduced in size to any great extent in the future, relative to what would be expected in the absence of any Project alone and in-combination impacts.

1685. Consequently, a conclusion of no AEoSI was reached for the gannet feature of the Sule Skerry and Sule Stack SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.28.6 Conclusions

1686. The Applicant has identified areas within the OAA in which no WTGs will be built, known as Restricted Build Areas (RBAs) (**Figure 6-57**). These areas have been identified as mitigation for shipping and navigation and seascape, landscape and visual impact topic areas (see **Section 4** of **West of Orkney Windfarm Introduction to the Addendum to the Offshore EIA (Excluding Offshore and Intertidal Ornithology** for more details). The RBAs reduce the area over which WTGs and other Offshore Project infrastructure will be built . The boundary of the OAA is 1.7 km from the Sule Skerry and Sule Stack SPA marine extension boundary, at its closest point. However, the RBA will ensure that the closest WTGs will be built at least 7 km from the SPA boundary and 9 km from the colony itself (see **Figure 6-57**). The RBAs mean that some birds that were included in the displacement mortality calculation would potentially not be displaced. Collision mortality estimates may also decrease, despite the same number and size of WTGs in the Project Design, if birds occur at higher densities in the RBAs. Whilst the consequence of the RBAs hasn't been considered in any quantitative reduction of impacts, it does mean that the impacts calculated for Sule Skerry and Sule Stack SPA qualifying features are a worst-case scenario and impacts would be expected to be lower than predicted in the impact assessment.

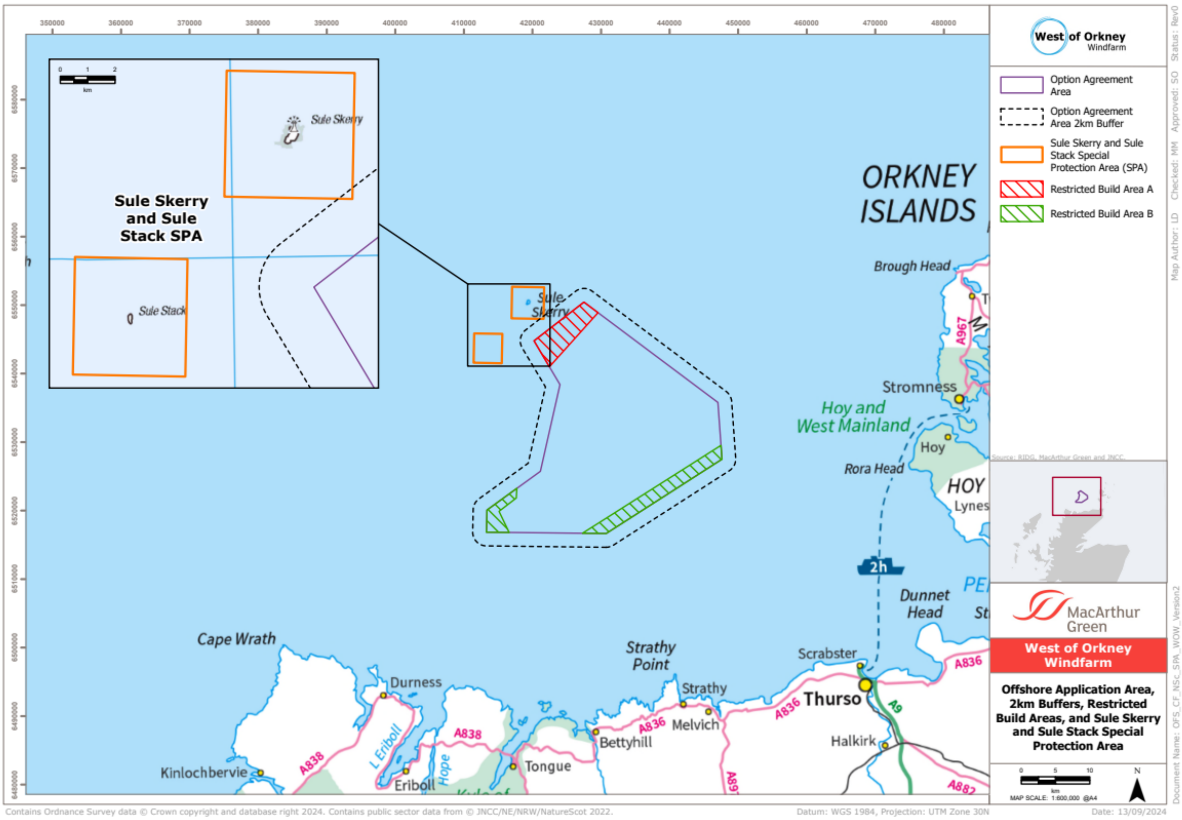


Figure 6-57. Map of the West of Orkney Windfarm OAA plus 2 km buffer, with the Restricted Build Areas indicated. The Sule Skerry and Sule Stack SPA is also shown, illustrating the increased distance between the SPA and the area of the OAA within which WTGs will be built, due to the RBAs.

1687. A conclusion of **no AEoSI** was reached for the **European storm petrel** feature of the **Sule Skerry and Sule Stack SPA**, from negative impacts from artificial lighting from the **Project alone** and **in-combination** with other OWFs.

1688. It was **not possible to conclude no AEoSI** for the **guillemot** feature of the **Sule Skerry and Sule Stack SPA**, from displacement impacts from the **Project alone** and **in-combination** impacts, which may have the potential to undermine the conservation objective: To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

1689. A conclusion of **no AEoSI** was reached for the **puffin** feature of the **Sule Skerry and Sule Stack SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1690. A conclusion of **no AEoSI** was reached for the **gannet** feature of the **Sule Skerry and Sule Stack SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1691. LSE was ruled out for all features of the breeding seabird assemblage, except for European storm petrel, guillemot, puffin and gannet. A conclusion of no AEoSI was reached for all features, with the exception of guillemot, for which it was not possible conclude no AEoSI. Consequently, it was also **not possible to conclude no AEoSI** for **Project alone** and **in-**

combination impacts on the **breeding seabird assemblage** feature of **Sule Skerry and Sule Stack SPA**.

1692. Based on the above assessment, it was not possible to conclude no AEoSI for Project alone and in-combination impacts on the Sule Skerry and Sule Stack SPA.

6.3.29 Troup, Pennan and Lion's Heads SPA

6.3.29.1 *Site Description*

1693. The Troup, Pennan and Lion's Heads SPA was classified on 14 March 1997, with marine extension classified on 25 September 2009, due to the populations of breeding seabirds. The site is approximately 160 km south-east of the Project.

1694. The Troup, Pennan and Lion's Heads SPA is a 9 km stretch of sea cliffs along the Aberdeenshire coast. The cliffs support large colonies of breeding seabirds. The boundary of the Special Protection Area overlaps with the boundary of Gamrie and Pennan coast SSSI and the seaward extension extends approximately 2 km into the marine environment to include the seabed, water column and surface.

6.3.29.2 *Conservation Objectives for the SPA*

1695. The conservation objectives of the Troup, Pennan and Lion's Heads SPA are:

- 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
- 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.

6.3.29.3 *Qualifying features*

1696. The qualifying features of the SPA are presented below in **Table 6-190**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

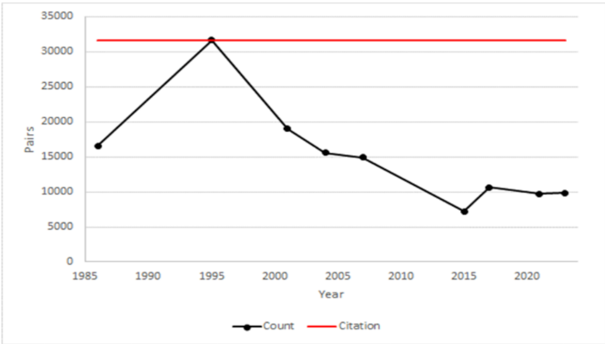
Table 6-190. Qualifying interests and condition for the Troup, Pennan and Lion's Heads SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake	31,600 pairs in 1995; 6% of the British population and 1% of the total population of the sub-species *R. t. tridactyla*	10,616 pairs	Unfavourable Declining	1 June 2023	Red
Herring gull*	4,200 pairs; 2% of the British breeding population	546 pairs	Unfavourable Declining	1 June 2023	Red

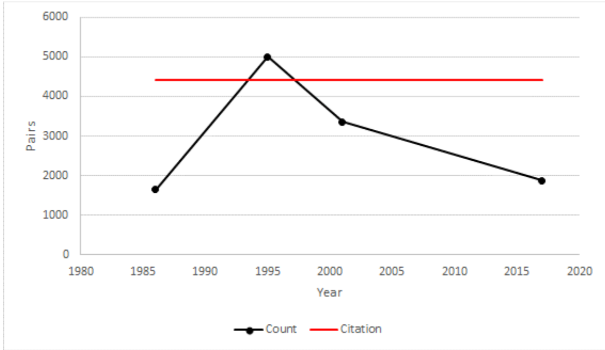
Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Guillemot	44,600 individuals in 1995; 4% of the British and 1% of total population of the sub-species *U. a. aalge* and *U. a. albionis*	23,801 individuals	Unfavourable Recovering	1 June 2023	Amber
Razorbill*	4,800 individuals	4,518 individuals	Favourable Recovered	1 June 2023	Amber
Fulmar*	4,400 pairs	1,894 pairs	Unfavourable No change	13 July 2017	Amber
Seabird assemblage	In 1995 the site supported about 150,000 individual seabirds of 9 species	n/a	Unfavourable Declining	3 July 2007	n/a

1697. Troup, Pennan and Lion's Heads SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 150,000 seabirds including nationally important populations of the following species: black-legged kittiwake, common guillemot, razorbill, herring gull and Northern fulmar.

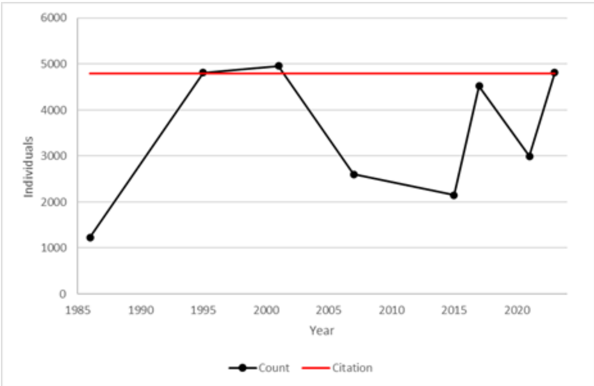
1698. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) colony count data was extracted from the SMP database. These counts were plotted and compared with the citation population size (**Figure 6-58**).



Kittiwake



Fulmar



Razorbill

Figure 6-58. Troup, Pennan and Lion's Heads SPA kittiwake qualifying feature population trends from 1986 - 2022 (citation population size shown by red line).

6.3.29.4 *Potential for the Project to impact the site's conservation objectives*

1699. The Troup, Pennan and Lion's Heads SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **razorbill** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

1700. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-**

breeding season) in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

1701. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

1702. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.29.5 *Assessment of predicted impacts for Project alone and in-combination*

1703. An in-combination assessment was undertaken that collated quantitative information on impacts to features of this SPA from published consent applications. Note that no other OWFs have been required to undertake a quantitative assessment of fulmar displacement/barrier impacts and so an in-combination assessment was not possible for this species. This was discussed and agreed with NatureScot (consultation meeting, 11 June 2024).

1704. Other reasonably foreseeable projects which have not yet submitted an application may also impact some of the qualifying features of this site. MD-LOT advised (by email, 10 June 2024) that a qualitative assessment of OWF projects for which a Scoping Opinion has been adopted should be undertaken.

1705. OWF projects for which a Scoping Opinion has been adopted and which identified possible impacts from their project on the Troup, Pennan and Lion's Heads SPA, in their Scoping Reports, are listed in **Table 6-191**.

Table 6-191. In-combination project with the potential to impact the Troup, Pennan and Lion's Heads SPA that have not yet submitted an application. Only features which could be impacted by Project impacts are listed

SPA qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Black-legged kittiwake				Y		Y
Northern fulmar		Y	Y	Y		Y
Razorbill		Y	Y	Y		Y

1706. The predicted impacts from these projects have not been considered in the quantitative assessment of the impacts from the Project in-combination with other reasonably foreseeable projects, as it is assumed that these projects will need to consider this Project in their in-combination assessments.

6.3.29.5.1 Kittiwake

1707. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the Troup, Pennan and Lion's Heads SPA population is presented in **Table 6-192**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-192. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the Troup, Pennan and Lion's Heads SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.12	0.02	0.12	0.07
Mortality - Non-breeding season (NatureScot)	0.97	0.16	0.97	0.46
Mortality - Autumn migration (BDMPS)	0.35	0.04	0.35	0.15
Mortality - Spring migration (BDMPS)	0.62	0.11	0.62	0.31
Annual Project alone mortality (collision + displacement)*	1.27		1.63	
Percentage point change in annual adult survival rate	0.01%		0.01%	
Annual in-combination mortality excl. Berwick Bank	47.20		51.61	
Percentage point change in annual adult survival rate	0.22%		0.24%	
Annual in-combination mortality incl. Berwick Bank	60.99		70.88	
Percentage point change in annual adult survival rate	0.29%		0.33%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1708. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1709. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

1710. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

1711. **Table 6-193** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the kittiwake population at Troup, Pennan and Lion's Heads SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix**

8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts includes information on all inputs to this PVA and a plot showing population size over time.

1712. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-193. Troup, Pennan and Lion's Heads SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	1.3	0.00005987424	25	1.0000	1.0000	0.0007	0.9986	1.0013	0.9990	0.9993	0.0186	0.9649	1.0361	49.3	50.9
Project alone CRM+High	1.6	0.00007655098	25	1.0000	0.9999	0.0007	0.9986	1.0013	0.9986	0.9990	0.0191	0.9647	1.0366	49.7	50.6
Incomb CRM+Low ex. BB	47.2	0.00222321367	25	0.9974	0.9974	0.0007	0.9959	0.9988	0.9346	0.9345	0.0180	0.8989	0.9706	41.5	58.0
Incomb CRM+High ex. BB	51.6	0.00243064630	25	0.9971	0.9971	0.0007	0.9957	0.9986	0.9283	0.9287	0.0179	0.8944	0.9643	41.2	58.5
Incomb CRM+Low inc. BB	61.0	0.00287255350	25	0.9966	0.9966	0.0007	0.9952	0.9981	0.9154	0.9156	0.0175	0.8829	0.9498	40.0	60.4
Incomb CRM+High inc. BB	70.9	0.00333842101	25	0.9961	0.9961	0.0007	0.9946	0.9975	0.9025	0.9027	0.0176	0.8669	0.9364	38.5	61.3
Project alone CRM+Low	1.3	0.00005987424	35	0.9999	0.9999	0.0006	0.9988	1.0012	0.9976	0.9985	0.0221	0.9561	1.0456	50.2	49.8
Project alone CRM+High	1.6	0.00007655098	35	0.9999	0.9999	0.0006	0.9987	1.0011	0.9980	0.9984	0.0217	0.9558	1.0431	50.5	49.7
Incomb CRM+Low ex. BB	47.2	0.00222321367	35	0.9974	0.9974	0.0006	0.9961	0.9987	0.9096	0.9098	0.0211	0.8682	0.9542	41.7	58.0
Incomb CRM+High ex. BB	51.6	0.00243064630	35	0.9971	0.9971	0.0006	0.9958	0.9984	0.9022	0.9022	0.0211	0.8621	0.9452	41.1	58.6
Incomb CRM+Low inc. BB	61.0	0.00287255350	35	0.9966	0.9966	0.0006	0.9954	0.9979	0.8852	0.8853	0.0199	0.8466	0.9239	39.0	60.1
Incomb CRM+High inc. BB	70.9	0.00333842101	35	0.9960	0.9961	0.0006	0.9948	0.9973	0.8666	0.8677	0.0200	0.8285	0.9074	38.0	62.0
Project alone CRM+Low	1.3	0.00005987424	50	1.0000	1.0000	0.0005	0.9989	1.0010	0.9979	0.9994	0.0270	0.9482	1.0522	50.2	49.9
Project alone CRM+High	1.6	0.00007655098	50	0.9999	1.0000	0.0005	0.9990	1.0010	0.9985	0.9993	0.0264	0.9459	1.0539	50.2	49.9
Incomb CRM+Low ex. BB	47.2	0.00222321367	50	0.9982	0.9982	0.0005	0.9971	0.9992	0.9112	0.9110	0.0255	0.8601	0.9613	42.0	57.3
Incomb CRM+High ex. BB	51.6	0.00243064630	50	0.9980	0.9980	0.0005	0.9969	0.9990	0.9036	0.9038	0.0249	0.8568	0.9565	41.4	57.3
Incomb CRM+Low inc. BB	61.0	0.00287255350	50	0.9976	0.9976	0.0005	0.9966	0.9987	0.8857	0.8860	0.0239	0.8407	0.9362	40.0	58.7
Incomb CRM+High inc. BB	70.9	0.00333842101	50	0.9972	0.9972	0.0005	0.9961	0.9983	0.8682	0.8682	0.0241	0.8205	0.9170	38.6	60.1

1713. Predicted Project alone impacts on the kittiwake population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

1714. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9961 (95% c.i. 0.9948-0.9973) (**Table 6-193**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.39%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the kittiwake population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Additionally, the Project contributed a mortality of only 1.6 birds per annum to the in-combination total of 71 birds per annum (including Berwick Bank Wind Farm impacts, worst case scenario). The in-combination total excluding Berwick Bank Wind Farm impacts was 52 birds per annum, which resulted in a change in population growth rate of 0.29%, i.e. Berwick Bank Wind Farm impacts comprise a substantial proportion of the in-combination impacts.

1715. The kittiwake feature condition was Unfavourable Declining, when last assessed in June 2023 and was below citation population size, of 31,600 pairs. Population size at this colony decreased by 44% between the two seabird censuses, Seabird 2000 and Seabirds Count, to 10,616 AON (Burnell *et al.*, 2023). Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). However, counts at the part of the Troup, Pennan and Lion's Heads SPA in 2023 found the population to be stable, suggesting HPAI has not impacted this population.

1716. Whilst the kittiwake population at Troup, Pennan and Lion's Heads SPA is substantially smaller than citation population size, the population has been stable in recent years. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any further declines and will not prevent or reduce the potential for this population to recover and to be restored in the long term.

1717. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the Troup, Pennan and Lion's Heads SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.29.5.2 Razorbill

1718. Predicted razorbill displacement mortality, by season, and change to annual adult survival rate apportioned to the Troup, Pennan and Lion's Heads SPA population is presented in

1720. **Table** 6-194. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-194. Estimated adult razorbill Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the Troup, Pennan and Lion's Heads SPA and change in baseline annual adult survival rate.
*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

RAZORBILL	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	0.01	0.02
Mortality - Autumn migration (BDMPS)	0.01	0.01
Mortality - Winter (BDMPS)	0.00	0.00
Mortality - Spring migration (BDMPS)	0.01	0.01
Annual Project alone mortality* (displacement)	0.01	0.02
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination mortality excl Berwick Bank	11.27	23.80
Percentage point change in annual adult survival rate	0.19%	0.39%
Annual in-combination mortality incl Berwick Bank	11.89	25.65
Percentage point change in annual adult survival rate	0.20%	0.42%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1721. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1722. Change in adult survival rate due to in-combination impacts did exceed 0.02% but, as Project alone mortality was less than 0.2 birds per annum, a PVA was also not required to assess in-combination impacts.

1723. Predicted Project alone and in-combination impacts on razorbill were sufficiently small to not warrant further investigation of population response to impacts (i.e. no PVA was required). Project alone mortality was estimated to be 0.02 birds per annum. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be maintained.

1724. Consequently, a conclusion of no AEoSI was reached for the razorbill feature of the St Kilda SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.29.5.3 Fulmar

1725. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the Troup, Pennan and Lion's Heads SPA population is presented in **Table 6-195**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features.

Table 6-195. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities (birds per annum) apportioned to the Troup, Pennan and Lion's Heads SPA and change in baseline annual adult survival rate

***See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.002	0.007
Mortality - Non-breeding season (NatureScot)	0.047	0.141
Mortality - Autumn migration (BDMPS)	0.018	0.055
Mortality - Winter (BDMPS)	0.007	0.022
Mortality - Spring migration (BDMPS)	0.021	0.064
Annual Project alone mortality* (displacement)	0.049	0.148
Percentage point change in annual adult survival rate	0.001%	0.004%

* Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations.

1726. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination assessment was undertaken for fulmar.

1727. Predicted Project alone impacts on fulmar were sufficiently small to not warrant further investigation of population response to impacts (i.e. no PVA was required).

1728. Fulmar feature condition is Unfavourable No Change, when last assessed in June 2017. There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmar at Troup, Pennan and Lion's Heads SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

1729. The very small predicted mortality from Project impacts on this population will not prevent or reduce the potential for this feature to be restored.

1730. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the Troup Pennan and Lion's Heads SPA, from displacement and barrier impacts from the Project alone. No in-combination assessment was undertaken for fulmar.

6.3.29.6 Conclusions

1731. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **Troup, Pennan and Lion's Heads SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1732. A conclusion of **no AEoSI** was reached for the **razorbill** feature of the **Troup, Pennan and Lion's Heads SPA**, from displacement impacts from the **Project alone** and in **in-combination** with other OWFs.

1733. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **Troup, Pennan and Lion's Heads SPA**, from displacement and barrier impacts from the **Project alone**.

1734. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, razorbill and fulmar, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **Troup, Pennan and Lion's Heads SPA**.

1735. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **Troup, Pennan and Lion's Heads SPA** was reached.

6.3.30 West Westray SPA

6.3.30.1 Site Description

1736. The West Westray SPA was classified on 16 August 1996, with marine extension classified on 25 September 2009, due to its populations of breeding seabirds. The site is approximately 60 km north-east of the Project.

1737. 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.

1738. 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.

6.3.30.2 Conservation Objectives for the SPA

1739. The conservation objectives of the West Westray SPA are:

- 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
- 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.

6.3.30.3 Qualifying features

1740. The qualifying features of the SPA are presented below in **Table 6-196**. This also shows the findings of the most recent assessment of feature condition, and the broader conservation status of the species, as determined by Stanbury *et al.* (2021) in *Birds of Conservation Concern 5*.

Table 6-196. Qualifying interests and condition for the West Westray SPA. Named components of the seabird assemblage, which are not features in their own right, are indicated by *.

Qualifying Interests	Citation population size	Seabirds Count population size	Feature Condition	Assessment Date	Broader Conservation Status
Kittiwake*	23,900 pairs, 5% of the GB population	2,755 pairs	Unfavourable Declining	1 June 2023	Red
Arctic skua*	78 pairs; 2% of the GB population	22 pairs	Unfavourable Declining	1 June 2021	Red
Arctic tern	1,140 pairs; 3% of the British breeding population	0 pairs	Unfavourable Declining	1 June 2021	Amber
Guillemot	42,150 individuals, 1.2% of the North Atlantic biogeographic population	28,697 individuals	Unfavourable No change	1 June 2023	Amber
Razorbill*	1,946 individuals, 1% of the GB population	2,159 individuals	Unfavourable Declining	1 June 2023	Red
Fulmar*	1,400 pairs, 0.2% of the GB population	1,165 pairs	Favourable Maintained	1 June 2021	Amber
Seabird assemblage	regularly supports 113,000 seabirds including nationally important populations	n/a	Unfavourable Declining	8 June 2017	n/a

1741. West Westray SPA qualifies under Article 4.2 by regularly supporting in excess of 20,000 individual seabirds. It regularly supports 113,000 seabirds including nationally important populations of the following species: black-legged kittiwake, Arctic tern, common guillemot, razorbill, Arctic skua and Northern fulmar.

1742. For each qualifying feature for which the site was screened in for further assessment (except the breeding seabird assemblage) count data was extracted from the SMP database. These counts were plotted and compared with the citation population size, where data allowed (**Figure 6-59**).

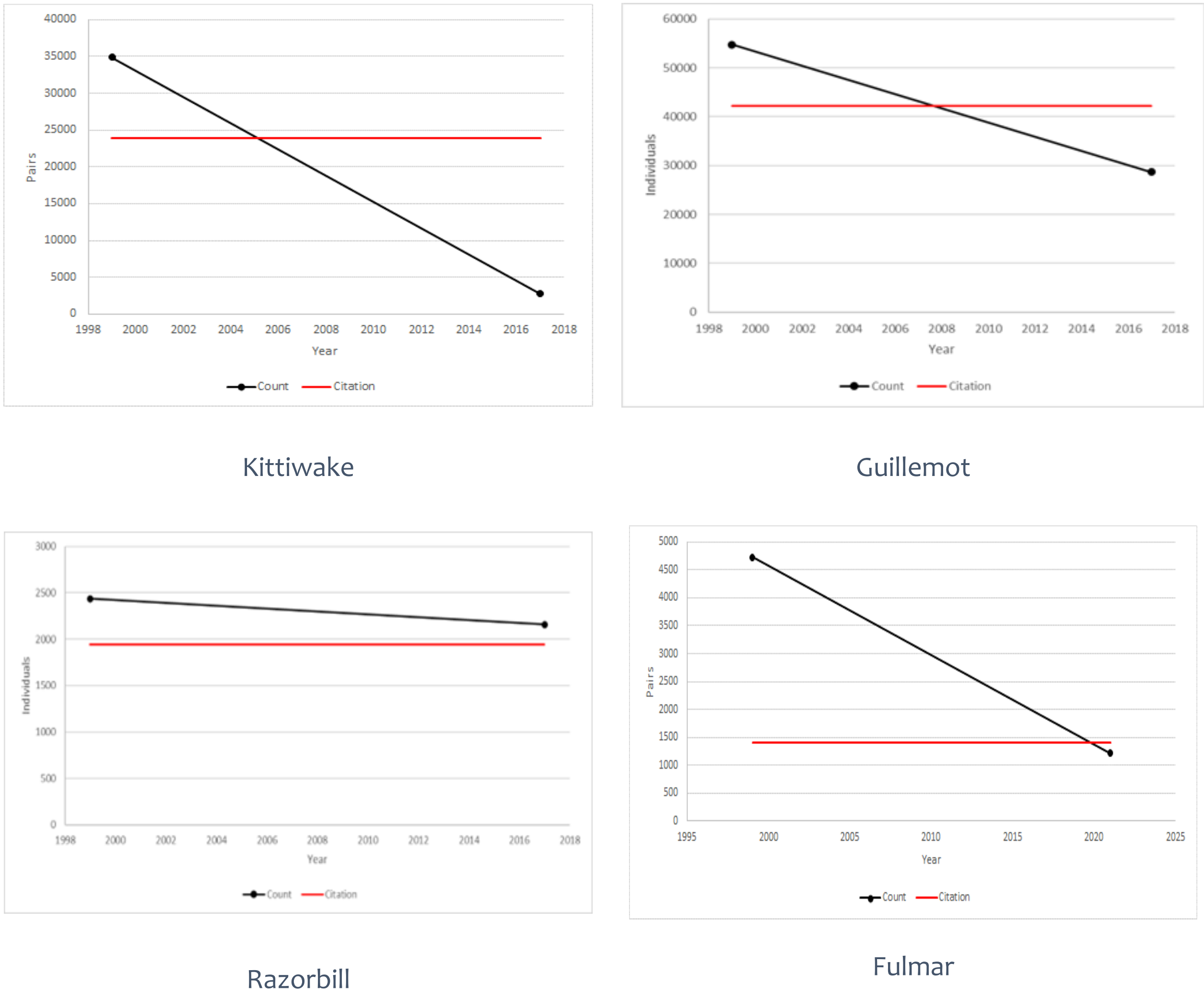


Figure 6-59. West Westray SPA qualifying feature population trends from 1981 - 2022 (citation population size shown by red line).

6.3.30.4 Potential for the Project to impact the site's conservation objectives

1743. The West Westray SPA was screened in for further assessment due to LSE being established for the following impact pathways and qualifying features:

- Displacement impacts from the offshore Project during operation on the **guillemot** qualifying feature, during the breeding and non-breeding season;
- Displacement impacts from the offshore Project during operation on the **razorbill** qualifying feature, during the breeding and non-breeding season;
- Collision and displacement impacts from the offshore Project during operation on the **kittiwake** qualifying feature, during the breeding and non-breeding season;
- Displacement and barrier effects from the offshore Project during operation on the **fulmar** qualifying feature, during the breeding and non-breeding season;
- Collision and/or displacement and barrier impacts from the offshore Project during operation on the **breeding seabird assemblage** qualifying feature, during the breeding and non-breeding season.

1744. LSE was ruled out for the other qualifying features and named components of the breeding seabird assemblage, due to an absence of theoretical connectivity, e.g. the offshore Project area is beyond foraging range of a feature from this SPA, or a lack of an impact pathway. Therefore, these qualifying features are not considered further here. See **Section 4.3** for details on why LSE was ruled out and **Table 2.4 (breeding season)** and **Table 2.5 (non-breeding season)** in **Appendix 2 – HRA: HRA Screening Technical Report** for the details of which features have not been considered here.

1745. These predicted impacts have the potential to undermine the conservation objective:

- To ensure for the qualifying species that the population of the species is maintained in the long term as a viable component of the site.

1746. As the site is not adjacent to nor overlapping with the offshore Project area (including a 2 km buffer around the OAA) and/or vessel activity outwith the offshore Project area, there is no potential for the Project to undermine any of the other conservation objectives.

6.3.30.5 Assessment of predicted impacts for Project alone and in-combination

1747. An in-combination assessment was undertaken that collated quantitative information on impacts to features of this SPA from published consent applications. Note that no other OWFs have been required to undertake a quantitative assessment of fulmar displacement/barrier impacts and so an in-combination assessment was not possible for this species. This was discussed and agreed with NatureScot (consultation meeting, 11 June 2024).

1748. Other reasonably foreseeable projects which have not yet submitted an application may also impact some of the qualifying features of this site. MD-LOT advised (by email, 10 June 2024) that a qualitative assessment of OWF projects for which a Scoping Opinion has been adopted should be undertaken.

1749. OWF projects for which a Scoping Opinion has been adopted and which identified possible impacts from their project on the West Westray SPA, in their Scoping Reports, are listed

1750. Other reasonably foreseeable projects have not yet submitted an application and may also impact some of the qualifying features of the West Westray SPA. These are summarised in **Table 6-197**.

Table 6-197. In-combination project with the potential to impact the West Westray SPA that have not yet submitted an application.

SPA qualifying feature	Broadshare Hub	Buchan	Culzean	Muir Mhor	Ossian	Stromar
Black-legged kittiwake	Y					Y
Common guillemot	Y					Y
Northern fulmar	Y					Y
Razorbill	Y					Y

1751. The predicted impacts from these projects have not been considered in the quantitative assessment of the impacts from the Project in-combination with other reasonably foreseeable projects, as it is assumed that these projects will need to consider this Project in their in-combination assessments.

6.3.30.5.1 Kittiwake

1752. Predicted kittiwake collision and displacement mortality, by season, and change to annual adult survival rate apportioned to the West Westray SPA population is presented in **Table 6-198**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

Table 6-198. Estimated adult kittiwake Project alone and in-combination collision and displacement seasonal and annual mortalities (birds per annum) apportioned to the West Westray SPA and change in baseline annual adult survival rate.
See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate*

KITTIWAKE	Collision (WCS)	Low Displacement (30%/1%)	Collision (WCS)	High Displacement (30%/3%)
Mortality - Breeding season (NatureScot)	0.29	0.05	0.29	0.16
Mortality - Non-breeding season (NatureScot)	0.79	0.13	0.79	0.38
Mortality - Autumn migration (BDMPS)	0.28	0.03	0.28	0.12
Mortality - Spring migration (BDMPS)	0.50	0.09	0.50	0.25
Annual Project alone mortality (collision + displacement)*	1.26		1.62	
Percentage point change in annual adult survival rate	0.02%		0.03%	
Annual in-combination mortality excl Berwick Bank	33.13		35.36	
Percentage point change in annual adult survival rate	0.60%		0.64%	
Annual in-combination mortality incl Berwick Bank	39.40		44.71	
Percentage point change in annual adult survival rate	0.72%		0.81%	

** Sum of collision plus displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1753. As change in adult survival rate from the Project alone impacts exceeded the 0.02% threshold, a PVA was required for Project alone impacts.

1754. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was also required to assess in-combination impacts.

1755. **Table 6-199** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and

Q-IMP) from the PVA model run for the kittiwake population at West Westray SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1756. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-199. West Westray SPA: Kittiwake PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'CRM' = collision mortality included; 'Low' OR 'High' = low or high displacement mortality scenario, 'ex. BB' = excluding Berwick Bank Wind Farm impacts from in-combination mortality, 'inc. BB'= including Berwick Bank Wind Farm impacts in the in-combination mortality.

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone CRM+Low	1.3	0.0002284603	25	0.9997	0.9997	0.0014	0.9971	1.0026	0.9928	0.9937	0.0376	0.9203	1.0723	49.3	51.2
Project alone CRM+High	1.6	0.0002944745	25	0.9997	0.9997	0.0014	0.9969	1.0028	0.9920	0.9934	0.0384	0.9214	1.0777	49.3	51.0
Incomb CRM+Low ex. BB	33.1	0.0060118393	25	0.9929	0.9929	0.0015	0.9898	0.9959	0.8296	0.8309	0.0337	0.7624	0.9011	32.3	70.1
Incomb CRM+High ex. BB	35.4	0.0064170111	25	0.9925	0.9925	0.0014	0.9896	0.9954	0.8205	0.8218	0.0325	0.7593	0.8903	31.2	70.7
Incomb CRM+Low inc. BB	39.4	0.0071503444	25	0.9916	0.9916	0.0014	0.9888	0.9944	0.8017	0.8035	0.0306	0.7480	0.8657	29.9	72.4
Incomb CRM+High inc. BB	44.7	0.0081145533	25	0.9905	0.9905	0.0014	0.9876	0.9933	0.7800	0.7801	0.0299	0.7217	0.8412	27.1	75.6
Project alone CRM+Low	1.3	0.0002284603	35	0.9997	0.9997	0.0012	0.9975	1.0022	0.9894	0.9914	0.0434	0.9074	1.0846	48.2	51.5
Project alone CRM+High	1.6	0.0002944745	35	0.9997	0.9997	0.0012	0.9973	1.0021	0.9880	0.9904	0.0452	0.9073	1.0839	48.3	51.5
Incomb CRM+Low ex. BB	33.1	0.0060118393	35	0.9929	0.9929	0.0013	0.9902	0.9954	0.7718	0.7736	0.0375	0.6993	0.8502	29.3	70.4
Incomb CRM+High ex. BB	35.4	0.0064170111	35	0.9924	0.9925	0.0013	0.9899	0.9950	0.7607	0.7621	0.0358	0.6957	0.8391	28.1	71.2
Incomb CRM+Low inc. BB	39.4	0.0071503444	35	0.9917	0.9916	0.0013	0.9891	0.9941	0.7390	0.7387	0.0349	0.6730	0.8063	26.5	73.3
Incomb CRM+High inc. BB	44.7	0.0081145533	35	0.9904	0.9905	0.0013	0.9880	0.9929	0.7079	0.7086	0.0333	0.6467	0.7734	22.8	77.2
Project alone CRM+Low	1.3	0.0002284603	50	0.9999	0.9999	0.0010	0.9979	1.0019	0.9959	0.9949	0.0525	0.8957	1.1026	50.5	49.8
Project alone CRM+High	1.6	0.0002944745	50	0.9999	0.9998	0.0010	0.9979	1.0018	0.9923	0.9931	0.0530	0.8947	1.0950	49.7	50.4
Incomb CRM+Low ex. BB	33.1	0.0060118393	50	0.9950	0.9950	0.0011	0.9927	0.9972	0.7730	0.7746	0.0451	0.6900	0.8692	31.2	67.4
Incomb CRM+High ex. BB	35.4	0.0064170111	50	0.9947	0.9947	0.0011	0.9926	0.9969	0.7621	0.7635	0.0432	0.6846	0.8545	31.0	69.0
Incomb CRM+Low inc. BB	39.4	0.0071503444	50	0.9941	0.9941	0.0011	0.9919	0.9962	0.7391	0.7406	0.0424	0.6576	0.8275	28.8	71.5
Incomb CRM+High inc. BB	44.7	0.0081145533	50	0.9933	0.9933	0.0011	0.9911	0.9954	0.7078	0.7092	0.0399	0.6325	0.7911	27.2	72.6

1757. The C-PGR for Project alone impacts after 35 years for the highest impact scenario of high displacement and WCS collision was 0.9997 (95% c.i. 0.9973-1.0021) (**Table 6-199**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.03%. This very small change indicates that the PVA trajectories with Project-alone impacts are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the kittiwake population will be of a similar size after 35 years, in the presence of Project impacts, as would be expected in the absence of Project impacts.

1758. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement and WCS collision, including Berwick Bank impacts, was 0.9905 (95% c.i. 0.9880-0.9929) (**Table 6-199**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.95%. This predicted small change to population growth rate indicates that the kittiwake population size might be slightly reduced in size, after 35 years, compared with what would be expected in the absence of these in-combination impacts. Note, the Project contributed a mortality of only 1.6 birds per annum to the in-combination total of 45 birds per annum (including Berwick Bank impacts, worst case scenario).

1759. The kittiwake feature condition was Unfavourable Declining, when last assessed in June 2023 and was below citation population size, of 23,900 pairs, when last counted[61]. The West Westray SPA colony, declined by 92% between the two seabird censuses, Seabird 2000 and Seabirds Count, to 2,755 AONs (Burnell *et al.*, 2023). Kittiwake populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The part of the West Westray SPA kittiwake colony that was counted showed an 18% decline between the Seabirds Count estimate and 2023, suggesting this population had been impacted by HPAI (Tremlett *et al.*, 2023).

1760. The West Westray SPA kittiwake population has declined considerably, as a result of factors other than offshore wind farms. While the PVA results indicate that in-combination mortality could further limit the potential for the population to recover, this would only be to a relatively small degree (i.e. a reduction in the population growth rate of up to 1%, as predicted using a worst case scenario). Therefore, the additional in-combination impact would not be expected to materially alter the population's status.

1761. Consequently, a conclusion of no AEoSI was reached for the kittiwake feature of the West Westray SPA, from collision and displacement impacts from the Project alone and in-combination with other OWFs.

6.3.30.5.2 Guillemot

1762. Predicted guillemot displacement mortality, by season, and change to annual adult survival rate apportioned to the West Westray SPA population is presented in **Table 6-200**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

[61] *SiteLink - West Westray SPA (nature.scot)*

1763. Note, almost all breeding season Project alone guillemot mortality was apportioned to the Sule Skerry and Sule Stack SPA, meaning virtually no Project alone breeding season mortality was apportioned to other SPAs.

Table 6-200. Estimated adult guillemot Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the West Westray SPA and change in baseline annual adult survival rate.
See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities and changes to survival rate.*

GUILLEMOT	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.00	0.00
Mortality - Non-breeding season (NatureScot)	1.09	3.28
Mortality - Non-breeding season (BDMPS)	1.10	3.29
Annual Project alone mortality* (displacement)	1.10	3.29
Percentage point change in annual adult survival rate	<0.01%	0.01%
Annual in-combination mortality	15.32	45.45
Percentage point change in annual adult survival rate	0.04%	0.12%

**Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1764. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1765. Change in adult survival rate due to in-combination impacts did exceed 0.02% and, as Project alone mortality was more than 0.2 birds per annum, a PVA was required to assess in-combination impacts.

1766. Despite a PVA not being required to assess the population response to Project alone impacts, scenarios including Project alone impacts were included in the PVA to allow a comparison of population response to Project alone and in-combination impacts.

1767. **Table 6-201** presents the outputs (counterfactual of growth rate, C-PGR; counterfactual of population size, C-PS; 50% quantities of impacted and unimpacted populations, Q-UNIMP and Q-IMP) from the PVA model run for the guillemot population at West Westray SPA, over a period of 25, 35 and 50 years. The Project is expecting to be operational for 30 years but an additional 5 years of impacts were modelled to account for the presence of WTGs causing impacts during construction, before the Project is fully operational, as well as after the Project ceases to be operational but before it is fully decommissioned. **Appendix 8 - HRA: PVA at SPA population scales for Project alone and in-combination impacts** includes information on all inputs to this PVA and a plot showing population size over time.

1768. The PVA metric of C-PGR is used to evaluate the population response to predicted impacts, due to C-PS being a function of number of years over which the model projected population size. See **Section 5.4.7** for a detailed explanation. A judgement on whether impacts are sufficient to undermine the site's conservation objectives, leading to a conclusion of adverse effect on site integrity, was made using both C-PGR and other relevant information on the qualifying feature, e.g. conservation status, recent population trends, other potential drivers of change affecting the population.

Table 6-201. West Westray SPA: Guillemot PVA results. Highlighted rows indicate the predicted impacts after 35 years for the mean C-PGR. 'Mortality' is birds per annum. 'Increase in mortality rate' = [change in adult annual survival rate / 100]. Med. = median value. C-PGR is counterfactual of population growth rate, C-PS is counterfactual of population size and Q-IMP is the 50th centile of the impacted population compared with the unimpacted population (Q-UNIMP). 'Low' OR 'High' = low or high displacement mortality scenario

Scenario	Mortality	Increase in mortality rate	Year	C-PGR					C-PS					50% Quantiles	
				Med.	Mean	SD	LCI	UCI	Med.	Mean	SD	LCI	UCI	Q-UNIMP-50%	Q-IMP-50%
Project alone Low	1.1	0.000028	25	1.0000	1.0000	0.0003	0.9994	1.0006	0.9994	0.9991	0.0085	0.9819	1.0153	48.6	51.0
Project alone High	3.3	0.000085	25	0.9999	0.9999	0.0003	0.9993	1.0005	0.9982	0.9977	0.0085	0.9811	1.0147	49.5	50.6
Incomb Low	15.3	0.000398	25	0.9996	0.9995	0.0003	0.9989	1.0002	0.9883	0.9883	0.0085	0.9712	1.0039	47.6	52.7
Incomb High	45.5	0.001182	25	0.9987	0.9987	0.0003	0.9981	0.9993	0.9664	0.9664	0.0085	0.9499	0.9828	42.8	58.2
Project alone Low	1.1	0.000028	35	1.0000	1.0000	0.0003	0.9995	1.0005	0.9987	0.9987	0.0095	0.9797	1.0178	50.1	50.0
Project alone High	3.3	0.000085	35	0.9999	0.9999	0.0003	0.9994	1.0004	0.9970	0.9967	0.0095	0.9778	1.0150	49.3	50.6
Incomb Low	15.3	0.000398	35	0.9996	0.9995	0.0003	0.9991	1.0000	0.9839	0.9838	0.0093	0.9660	1.0013	47.4	53.3
Incomb High	45.5	0.001182	35	0.9987	0.9987	0.0003	0.9982	0.9992	0.9536	0.9536	0.0093	0.9353	0.9723	41.3	58.9
Project alone Low	1.1	0.000028	50	1.0000	1.0000	0.0002	0.9996	1.0004	0.9985	0.9988	0.0103	0.9798	1.0195	49.8	50.5
Project alone High	3.3	0.000085	50	0.9999	0.9999	0.0002	0.9996	1.0003	0.9967	0.9968	0.0106	0.9769	1.0178	49.0	51.2
Incomb Low	15.3	0.000398	50	0.9997	0.9997	0.0002	0.9993	1.0001	0.9840	0.9839	0.0101	0.9648	1.0040	47.1	52.8
Incomb High	45.5	0.001182	50	0.9991	0.9991	0.0002	0.9987	0.9995	0.9532	0.9534	0.0103	0.9339	0.9735	41.9	57.9

1769. Predicted Project alone impacts on the guillemot population were sufficiently small (change to baseline annual adult survival rate <0.02%) to not warrant further investigation of population response to impacts (i.e. no PVA was required).

1770. The C-PGR for the Project in-combination with other OWFs after 35 years for the highest impact scenario of high displacement, was 0.9987 (95% c.i. 0.9982-0.9992) (**Table 6-201**). The predicted reduction in population growth rate under this highest impact worst case scenario was 0.13%. This small change indicates that the PVA trajectories with Project impacts, in-combination with impacts from other OWFs, are very similar to baseline trajectories with no impacts, i.e. it is highly likely that the guillemot population will be of a similar size after 35 years, in the presence of Project impacts in-combination with impacts from other OWF, as would be expected in the absence of these impacts. Additionally, the Project contributed a mortality of only 4 birds per annum to the in-combination total of 45 birds per annum (worst case scenario).

1771. The guillemot feature condition is Unfavourable No Change[62]. Population size at this colony decreased by 48% between the two seabird censuses, Seabird 2000 and Seabirds Count (Burnell *et al.*, 2023). Guillemot populations are known to have been impacted by the HPAI epidemic in 2021 and 2022 (Tremlett *et al.*, 2024). The part of the West Westray SPA guillemot population that was counted in 2023 suggested no substantial change in population size, since the Seabirds Count estimate (Tremlett *et al.*, 2024). This suggests this population was not impacted by HPAI.

1772. Whilst the guillemot population at West Westray SPA is substantially smaller than citation population size, the Project alone and in-combination impacts on this population are predicted to be sufficiently small to not further exacerbate any declines and will not prevent or reduce the potential for this population to recover and to be restored in the long term.

1773. Consequently, a conclusion of no AEoSI was reached for the guillemot feature of the West Westray SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.30.5.3 Razorbill

1774. Predicted razorbill displacement mortality, by season, and change to annual adult survival rate apportioned to the West Westray SPA population is presented in **Table 6-202**. In-combination impacts from other OWFs, with the Project impacts, are also presented, with Berwick Bank Wind Farm impacts included and excluded, as requested by NatureScot (letter from NatureScot to the Project, dated 3 June 2024).

[62] *SiteLink - West Westray SPA (nature.scot)*

Table 6-202. Estimated adult razorbill Project alone and in-combination displacement seasonal and annual mortalities (birds per annum) apportioned to the West Westray SPA and change in baseline annual adult survival rate.

*See **Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts** for more details on calculation of mortalities and changes to survival rate.*

RAZORBILL	Low Displacement (Breeding = 60%/3%. Non-breeding = 60%/1%)	High Displacement (Breeding = 60%/5%. Non-breeding = 60%/3%)
Mortality - Breeding season (NatureScot)	0.03	0.04
Mortality - Non-breeding season (NatureScot)	0.00	0.01
Mortality - Autumn migration (BDMPS)	0.00	0.00
Mortality - Winter (BDMPS)	0.00	0.00
Mortality - Spring migration (BDMPS)	0.00	0.00
Annual Project alone mortality* (displacement)	0.04	0.05
Percentage point change in annual adult survival rate	<0.01%	<0.01%
Annual in-combination mortality excl. Berwick Bank	1.17	3.38
Percentage point change in annual adult survival rate	0.04%	0.12%
Annual in-combination mortality incl. Berwick Bank	1.36	3.93
Percentage point change in annual adult survival rate	0.05%	0.14%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1775. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts.

1776. Change in adult survival rate due to in-combination impacts did exceed 0.02% but, as Project alone mortality was less than 0.2 birds per annum, a PVA was also not required to assess in-combination impacts.

1777. Predicted Project alone and in-combination impacts on razorbill were sufficiently small to not warrant further investigation of population response to impacts (i.e. no PVA was required). Project alone mortality was estimated to be 0.05 birds per annum. The Project alone and in-combination impacts on this population are predicted to be sufficiently small to not exacerbate any declines and to not prevent or reduce the potential for this population to be restored.

1778. Consequently, a conclusion of no AEoSI was reached for the razorbill feature of the West Westray SPA, from displacement impacts from the Project alone and in-combination with other OWFs.

6.3.30.5.4 Fulmar

1779. Predicted fulmar displacement mortality, by season, and change to annual adult survival rate apportioned to the West Westray SPA population is presented in **Table 6-203**. No in-combination assessment was possible for fulmar since no other OWFs have undertaken a quantitative assessment of impacts to fulmar qualifying features.

Table 6-203. Estimated adult fulmar Project alone displacement/barrier seasonal and annual mortalities (birds per annum) apportioned to the West Westray SPA and change in baseline annual adult survival rate

See Appendix 6 - HRA: Calculation of mortalities and change in survival rate at SPA population scales for Project alone and in-combination impacts *for more details on calculation of mortalities.*

FULMAR	Low Displacement (20%/1%)	High Displacement (20%/3%)
Mortality - Breeding season (NatureScot)	0.010	0.029
Mortality - Non-breeding season (NatureScot)	0.016	0.049
Mortality - Autumn migration (BDMPS)	0.006	0.019
Mortality - Winter (BDMPS)	0.003	0.008
Mortality - Spring migration (BDMPS)	0.007	0.022
Annual Project alone mortality* (displacement)	0.026	0.078
Percentage point change in annual adult survival rate	0.001%	0.003%

** Sum of displacement mortality for NatureScot breeding and non-breeding seasons. Note that in some cases there may be an apparent discrepancy of up to 0.01 in the summed seasonal mortality values. This is just presentational, with values rounded for clarity in the reporting and does not reflect the actual values used in the assessment calculations*

1780. As change in adult survival rate from the Project alone impacts did not exceed the 0.02% threshold, a PVA was not required for Project alone impacts. No in-combination assessment was undertaken for fulmar.

1781. Fulmar feature condition is Favourable Maintained, when last assessed in June 2021. There is no evidence of fulmar populations being impacted by the HPAI epidemic and no additional counts of fulmar at West Westray SPA were undertaken in 2023 with the purpose of assessing impacts of HPAI (Tremlett *et al.*, 2024).

1782. The very small predicted mortality from Project impacts on this population will not prevent or reduce the potential for this feature to be maintained in the long term.

1783. Consequently, a conclusion of no AEoSI was reached for the fulmar feature of the West Westray SPA, from displacement and barrier impacts from the Project alone. No in-combination assessment was undertaken for fulmar.

6.3.30.6 Conclusions

1784. A conclusion of **no AEoSI** was reached for the **kittiwake** feature of the **West Westray SPA**, from collision and displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1785. A conclusion of **no AEoSI** was reached for the **guillemot** feature of the **West Westray SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1786. A conclusion of **no AEoSI** was reached for the **razorbill** feature of the **West Westray SPA**, from displacement impacts from the **Project alone** and **in-combination** with other OWFs.

1787. A conclusion of **no AEoSI** was reached for the **fulmar** feature of the **West Westray SPA**, from displacement and barrier impacts from the **Project alone**.

1788. LSE was ruled out for all features of the breeding seabird assemblage, except for kittiwake, guillemot, razorbill and fulmar, for which a conclusion of no AEoSI was reached. Consequently, a conclusion of **no AEoSI** was also reached for **Project alone** and **in-combination** impacts on the **breeding seabird assemblage** feature of **West Westray SPA**.

1789. Based on the above assessment and a conclusion of no AEoSI for all features of the site, a conclusion of **no AEoSI** for **Project alone** and **in-combination** impacts on the **West Westray SPA** was reached.

7 CONCLUSIONS

7.1 Summary of conclusions on adverse effect on site integrity

This assessment has been conducted in accordance with NatureScot guidance and advice. The Project's conclusions on the above assessments are summarised below. An initial list of SPAs with theoretical connectivity to the Project (e.g. within foraging range of species designated as breeding features) was compiled, from which an initial determination on the risk of LSE was made. These are grouped by impact pathway:

- SPAs with breeding seabird features for which LSE could not be ruled out for the Project alone or in-combination due to disturbance/displacement impacts and negative impacts from artificial lighting, during Project construction and decommissioning;
- SPAs with breeding seabird features for which LSE could not be ruled out due to collision and/or displacement impacts for the Project alone or in-combination, as well as negative impacts from artificial lighting, during Project operation;
- SPAs with breeding red-throated diver features and wintering waterfowl features for which LSE could not be ruled out due to vessel activity during construction, operation and decommissioning for the Project alone or in-combination;
- SPAs with migratory species features for which LSE could not be ruled out due to collision risk during Project operation for the Project alone or in-combination.

A conclusion of no AEoSI was reached for all SPAs with the exception of:

- **Sule Skerry and Sule Stack SPA**, for which it was not possible to reach a conclusion of no AEoSI due to displacement impacts, both from **Project alone and in-combination** with other OWFs, on the **common guillemot** qualifying feature;
- **East Caithness Cliffs SPA** for which it was not possible to reach a conclusion of no AEoSI due to collision and displacement impacts, from the Project **in-combination** with other OWFs (both including or excluding Berwick Bank[63]), on the **black-legged kittiwake** qualifying feature;
- **North Caithness Cliffs SPA** for which it was not possible to reach a conclusion of no AEoSI due to collision and displacement impacts, from the Project **in-combination** with other OWFs (both including or excluding Berwick Bank), on the **black-legged kittiwake** qualifying feature.

7.1.1 SPAs with breeding seabird features and LSE from impact pathways during operation

Table 7-1 lists all SPAs with breeding seabird qualifying features for which LSE could not be ruled out for the Project alone or in-combination due to the impact pathways during operation of (i) collision with WTGs, (ii) displacement and/or barrier effects due to the presence of WTGs and other offshore infrastructure, and (iii) negative impacts from artificial lighting. The table lists all qualifying features of each SPA, including named components of any breeding seabird assemblage

[63] Note that a decision on Berwick Bank has not been made at time of writing, but nevertheless it is assumed that any impacts from this project which form part of this in-combination assessment will be subject to a requirement for compensation.

feature. Those qualifying features for which LSE could not be ruled out for the Project alone or in-combination under the three impact pathways are indicated in the table by 'BS' or 'NBS', which refers to whether theoretical connectivity with the offshore Project was found for the breeding season and/or the non-breeding season. A conclusion of no AEoSI was reached for all sites, with the exception of Sule Skerry and Sule Stack SPA (displacement impacts from the Project alone on the guillemot feature), North Caithness Cliffs SPA (displacement and collision impacts from the Project in-combination with other OWFs, for the kittiwake feature) and East Caithness Cliffs SPA (displacement and collision impacts from the Project in-combination with other OWFs, for the kittiwake feature).

Table 7-1. List of SPAs with breeding seabird qualifying features for which LSE could not be ruled out for the Project alone or in-combination due to collision and/or displacement impacts within the OAA during Project operation. A conclusion of no AEoSI was reached for all sites and features, except for the three highlighted in red, for which it was not possible to conclude no AEoSI. Impact pathways: 'coll' = collision, 'disp' = displacement/barrier, 'light' = negative impacts from artificial lighting. Season in which theoretical connectivity was established: 'BS' = breeding season, 'NBS' = non-breeding season. Features with an '*' are named components of a breeding seabird assemblage.

SPA Name	Qualifying Features	Distance to OAA (km)	Great black-backed gull	Common guillemot	Razorbill	Atlantic Puffin		Black-legged kittiwake		European storm-petrel	Northern gannet		Great skua	Northern fulmar	Manx shearwater
Impact pathway			Coll	Disp	Disp	light	Disp	Coll	Disp	Light	Coll	Disp	Coll	Disp	Light
Ailsa Craig	Breeding: northern gannet, lesser black-backed gull, herring gull*, black-legged kittiwake*, common guillemot*	391.9									BS	BS			
Auskerry	Breeding: European storm-petrel, Arctic tern	77.6								BS					
Buchan Ness to Collieston Coast SPA	Breeding: northern fulmar*, European shag*, herring gull*, black-legged kittiwake*, common guillemot*	199.4						BS + NBS	BS + NBS					BS + NBS	
Calf of Eday	Breeding: northern fulmar*, great cormorant*, great black-backed gull*, black-legged kittiwake*, common guillemot*	72.3	BS + NBS	BS + NBS				BS + NBS	BS + NBS					BS + NBS	
Canna and Sanday	Breeding: European shag*, herring gull*, black-legged kittiwake*, common guillemot*, Atlantic puffin*	221.9					BS + NBS	BS + NBS	BS + NBS						
Cape Wrath	Breeding: northern fulmar*, black-legged kittiwake*, common guillemot*, razorbill*, Atlantic puffin*	25.9		BS + NBS	BS + NBS		BS + NBS	BS + NBS	BS + NBS					BS + NBS	
Copeland Islands	Breeding: Manx shearwater, Arctic tern	458.8													BS

SPA Name	Qualifying Features	Distance to OAA (km)	Great black-backed gull	Common guillemot	Razorbill	Atlantic Puffin		Black-legged kittiwake		European storm-petrel	Northern gannet		Great skua	Northern fulmar	Manx shearwater
Impact pathway			Coll	Disp	Disp	light	Disp	Coll	Disp	Light	Coll	Disp	Coll	Disp	Light
Copinsay	Breeding: northern fulmar*, great black-backed gull*, black-legged kittiwake*, common guillemot*	67.2	BS + NBS	BS + NBS				BS + NBS	BS + NBS					BS + NBS	
Coquet Island	Breeding: Roseate tern, Sandwich tern, Arctic tern, common tern, Atlantic puffin*, black-headed gull	415.8					NBS								
East Caithness Cliffs	Breeding: northern fulmar*, great cormorant*, European shag, peregrine falcon, herring gull, great black-backed gull*, black-legged kittiwake, common guillemot, razorbill	70.1	BS + NBS	BS + NBS	BS + NBS			BS + NBS	BS + NBS					BS + NBS	
Fair Isle	Breeding: northern fulmar*, northern gannet*, European shag*, Arctic skua*, great skua*, black-legged kittiwake*, Arctic tern, common guillemot, razorbill*, Atlantic puffin*, Fair Isle wren	140.1		BS + NBS	BS + NBS		BS + NBS	BS + NBS	BS + NBS		BS + NBS	BS + NBS	BS + NBS	BS + NBS	
Farne Islands	Breeding: Roseate tern, common tern, Arctic tern, Sandwich tern, common guillemot, Atlantic puffin*, European shag*, Great cormorant*, black-legged kittiwake*	382.4					NBS	NBS	NBS						
Fetlar	Breeding: northern fulmar*, whimbrel, red-necked phalarope, Arctic skua*, great skua, Arctic tern, dunlin	241.6											BS + NBS	BS + NBS	
Flamborough and Filey Coast	Breeding: northern gannet, black-legged kittiwake, common guillemot, razorbill, northern fulmar*	556.7			NBS			NBS	NBS		NBS	NBS		BS + NBS	

SPA Name	Qualifying Features	Distance to OAA (km)	Great black-backed gull	Common guillemot	Razorbill	Atlantic Puffin		Black-legged kittiwake		European storm-petrel	Northern gannet		Great skua	Northern fulmar	Manx shearwater
Impact pathway			Coll	Disp	Disp	light	Disp	Coll	Disp	Light	Coll	Disp	Coll	Disp	Light
Flannan Isles	Breeding: razorbill, Atlantic puffin, fulmar, black legged kittiwake, common guillemot	183.9					BS + NBS	BS + NBS	BS + NBS					BS + NBS	
Forth Islands	Breeding: northern gannet, great cormorant*, European shag, lesser black-backed gull, herring gull*, black-legged kittiwake*, Sandwich tern, roseate tern , common tern , Arctic tern , common guillemot*, razorbill*, Atlantic puffin	301.9			NBS		NBS	BS + NBS	BS + NBS		BS + NBS	BS + NBS			
Foula	Breeding: red-throated diver, northern fulmar*, Leach's storm-petrel, European shag, Arctic skua*, great skua, black-legged kittiwake*, Arctic tern, common guillemot, razorbill*, Atlantic puffin	160.9			BS + NBS		BS + NBS	BS + NBS	BS + NBS				BS + NBS	BS + NBS	
Fowlsheugh	Breeding: northern fulmar*, herring gull*, black-legged kittiwake, common guillemot, razorbill*	236.8			NBS			BS + NBS	BS + NBS					BS + NBS	
Glannau Aberdaron ac Ynys Enlli/ Aberdaron Coast and Bardsey Island	Breeding: Manx shearwater, red-billed chough	660.3													BS
Handa	Breeding: northern fulmar*, Arctic skua, great skua*, black-legged kittiwake*, common guillemot, razorbill	56.1		BS + NBS	BS + NBS			BS + NBS	BS + NBS				BS + NBS	BS + NBS	

SPA Name	Qualifying Features	Distance to OAA (km)	Great black-backed gull	Common guillemot	Razorbill	Atlantic Puffin		Black-legged kittiwake		European storm-petrel	Northern gannet		Great skua	Northern fulmar	Manx shearwater
Impact pathway			Coll	Disp	Disp	light	Disp	Coll	Disp	Light	Coll	Disp	Coll	Disp	Light
Hermaness, Saxa Vord and Valla Field	Breeding: red-throated diver, northern fulmar*, northern gannet, European shag*, great skua, black-legged kittiwake*, common guillemot*, Atlantic puffin	257.7					BS + NBS	BS + NBS	BS + NBS		BS + NBS	BS + NBS	BS + NBS	BS + NBS	
Hoy	Breeding: red-throated diver, northern fulmar*, peregrine falcon, Arctic skua*, great skua, great black-backed gull*, black-legged kittiwake*, common guillemot*, Atlantic puffin*	24.7	BS + NBS	BS + NBS			BS + NBS	BS + NBS	BS + NBS				BS + NBS	BS + NBS	
Irish Sea Front	Breeding: Manx shearwater	558.6													BS
Marwick Head	Breeding: black-legged kittiwake*, common guillemot	35		BS + NBS				BS + NBS	BS + NBS						
Mingulay and Berneray	Breeding: northern fulmar*, European shag*, black-legged kittiwake*, common guillemot*, razorbill, Atlantic puffin*	282.5			BS + NBS			BS + NBS	BS + NBS					BS + NBS	
Mousa	Breeding: European storm-petrel, Arctic tern	193.2								BS					
North Caithness Cliffs	Breeding: northern fulmar*, peregrine falcon, black-legged kittiwake*, common guillemot, razorbill*, Atlantic puffin*	27.2		BS + NBS[1]	BS + NBS[1]		BS + NBS[1]	BS + NBS	BS + NBS[1]					BS + NBS[1]	
North Rona and Sula Sgeir	Breeding: northern fulmar*, European storm-petrel, Leach's storm-petrel, northern gannet, great black-backed gull*, black-legged kittiwake*, common guillemot, razorbill*, Atlantic puffin*	79.7		BS + NBS	BS + NBS		BS + NBS	BS + NBS	BS + NBS	BS	BS + NBS	BS + NBS		BS + NBS	

SPA Name	Qualifying Features	Distance to OAA (km)	Great black-backed gull	Common guillemot	Razorbill	Atlantic Puffin		Black-legged kittiwake		European storm-petrel	Northern gannet		Great skua	Northern fulmar	Manx shearwater
Impact pathway			Coll	Disp	Disp	light	Disp	Coll	Disp	Light	Coll	Disp	Coll	Disp	Light
Northumberland Marine	Breeding: Atlantic puffin, little tern, Roseate tern, common tern, Arctic tern, Sandwich tern, common guillemot, European shag*, great cormorant*, black-headed gull*, kittiwake*	363.2					NBS								
Noss	Breeding: northern fulmar*, northern gannet, great skua, black-legged kittiwake*, common guillemot, Atlantic puffin*	206.3					BS + NBS	BS + NBS	BS + NBS		BS + NBS	BS + NBS	BS + NBS	BS + NBS	
Outer Firth of Forth and St Andrews Bay Complex	Breeding: Manx shearwater, northern gannet, European shag, herring gull, black-legged kittiwake, common tern, arctic tern, common guillemot, puffin, razorbill	266			NBS		BS + NBS	BS + NBS	BS + NBS		BS + NBS	BS + NBS			BS
Priest Island (Summer Isles)	Breeding: European storm-petrel	108.2								BS					
Ronas Hill - North Roe and Tingon	Breeding: red-throated diver, great skua	219.2											BS + NBS		
Rousay	Breeding: northern fulmar*, Arctic skua*, black-legged kittiwake*, Arctic tern, common guillemot*	49.3		BS + NBS				BS + NBS	BS + NBS					BS + NBS	
Rum	Breeding: red-throated diver, Manx shearwater, golden eagle, black-legged kittiwake*, common guillemot*	212.2						BS + NBS	BS + NBS						BS
Seas off Foula	Breeding: northern fulmar, arctic skua, great skua, common guillemot, Atlantic puffin	126.9		BS + NBS			BS + NBS						BS + NBS	BS + NBS	

SPA Name	Qualifying Features	Distance to OAA (km)	Great black-backed gull	Common guillemot	Razorbill	Atlantic Puffin		Black-legged kittiwake		European storm-petrel	Northern gannet		Great skua	Northern fulmar	Manx shearwater
Impact pathway			Coll	Disp	Disp	light	Disp	Coll	Disp	Light	Coll	Disp	Coll	Disp	Light
Seas off St Kilda	Breeding: northern fulmar, European storm-petrel, northern gannet, common guillemot, Atlantic puffin	197.1					BS + NBS			BS + NBS	BS + NBS	BS + NBS		BS BS + NBS	
Shiant Isles	Breeding: northern fulmar*, European shag, black-legged kittiwake*, common guillemot*, razorbill, Atlantic puffin	141.7		NBS	NBS		BS + NBS	BS + NBS	BS + NBS					BS + NBS	
Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro	Breeding: Manx shearwater, European storm-petrel, lesser black-backed gull, Atlantic puffin, short-eared owl, red-billed chough, razorbill*, common guillemot*, black-legged kittiwake*	780.4													BS
St Abb's Head to Fast Castle	Breeding: razorbill, herring gull, European shag, black-legged kittiwake, common guillemot	337.6			NBS			NBS	NBS						
St Kilda	Breeding: Northern fulmar*, Manx shearwater*, European storm-petrel , Leach's storm-petrel , Northern gannet, Great skua , Black-legged kittiwake*, Common guillemot*, Razorbill*, Atlantic puffin	249.8			NBS		BS + NBS	BS + NBS	BS + NBS	BS	BS + NBS	BS + NBS	BS + NBS	BS + NBS	BS
Sule Skerry and Sule Stack	Breeding: European storm-petrel, Leach's storm-petrel, northern gannet, European shag*, common guillemot*, Atlantic puffin	1.7		BS + NBS		BS + NBS	BS + NBS			BS	BS + NBS	BS + NBS			

SPA Name	Qualifying Features	Distance to OAA (km)	Great black-backed gull	Common guillemot	Razorbill	Atlantic Puffin		Black-legged kittiwake		European storm-petrel	Northern gannet		Great skua	Northern fulmar	Manx shearwater
Impact pathway			**Coll**	**Disp**	**Disp**	**light**	**Disp**	**Coll**	**Disp**	**Light**	**Coll**	**Disp**	**Coll**	**Disp**	**Light**
Sumburgh Head	Breeding: northern fulmar*, black-legged kittiwake*, Arctic tern, common guillemot*	177.2						BS + NBS	BS + NBS					BS + NBS	
Treshnish Isles	Breeding: European storm-petrel	275.6								BS					
Troup, Pennan and Lion's Heads	Breeding: northern fulmar*, herring gull*, black-legged kittiwake, common guillemot, razorbill*	160.1			NBS			BS + NBS	BS + NBS					BS + NBS	
West Westray	Breeding: northern fulmar*, Arctic skua*, black-legged kittiwake*, Arctic tern, common guillemot, razorbill*	60.2		BS + NBS	BS + NBS			BS + NBS	BS + NBS					BS + NBS	

1. Additional impact pathway for North Caithness Cliffs SPA qualifying features of displacement/disturbance in site's marine extension from vessels transiting to/from Scrabster Harbour. Conclusion of no AEoSI for this impact pathway.

7.1.2 SPAs with breeding seabird features and LSE from impact pathways during construction

1790. LSE could not be ruled out for same sites and features listed in **Table 7-1** due to disturbance/displacement impacts from the Project alone or in-combination and/or negative impacts from artificial lighting occurring during Project construction and decommissioning. In addition, Pentland Firth Islands SPA was screened in for disturbance/displacement impacts on the Arctic tern qualifying feature, using the ECC (but not the OAA, as this was beyond foraging range for this feature at this site).

1791. A conclusion of no AEoSI was reached for the Project alone or in-combination for all sites with breeding seabird features for which LSE could not be ruled out due to impact pathways occurring during Project construction or decommissioning.

7.1.3 SPAs with breeding red-throated diver features and wintering waterfowl features for which LSE could not be ruled out due to vessel activity during construction

1792. **Table 7-2** lists all the SPAs for which LSE could not be ruled out for the Project alone or in-combination due to the impact pathway of displacement/disturbance from vessels transiting between ports/harbours and the offshore Project area during Project construction and decommissioning, as well as in the ECC during installation and decommissioning. These SPAs had breeding red-throated diver qualifying features and/or wintering waterfowl features. Note that consideration of the potential for AEoSI on the breeding seabird features using the marine extension of North Caithness Cliffs SPA due to impacts from vessels transiting to/from Scrabster Harbour is included in that SPA's assessment (see **Table 7-1**).

1793. Marine SPAs with wintering waterfowl features and breeding red-throated diver features were screened in due to vessels transiting between ports used for construction and the offshore Project area. Indicative vessel routes to/from ports mean vessels would either transit through an SPA or within 15 km of an SPA.

1794. Hoy SPA and Orkney Mainland Moors SPA were also screened in due to being functionally linked to Scapa Flow SPA. Red-throated divers using Scapa Flow for foraging and other maintenance behaviours breed at these two terrestrial SPAs. Disturbance/displacement impacts in the Scapa Flow SPA on this feature could indirectly impact the terrestrial SPAs too.

1795. In addition, Caithness and Sutherland Peatlands SPA has a breeding red-throated diver feature that is within foraging range of the export cable corridor. LSE could not be ruled out due to the impact pathway of displacement/disturbance by vessels in the ECC undertaking cable laying.

1796. A conclusion of no AEoSI was reached for the Project alone or in-combination for all the SPAs listed in **Table 7-2**.

Table 7-2. List of all SPAs for which LSE could not be ruled out due to disturbance/displacement impacts by vessels during Project construction

Site Name (SPA)	Qualifying Features	Theoretical connectivity	Conclusion
Scapa Flow	Breeding season features: Red-throated diver. Non-breeding season features: Black-throated diver, eider, great northern diver, long-tailed duck, red-breasted merganser, shag, Slavonian grebe	Vessels associated with construction transiting between Scapa Deep Water Quay and offshore Project area transiting **through SPA**	No AEoSI
Moray Firth	Non-breeding season features: Common scoter, eider, goldeneye, great northern diver, long-tailed duck, red-breasted merganser, red-throated diver, scaup, shag, Slavonian grebe, velvet scoter	Vessels associated with construction transiting between Port of Nigg, Port of Cromarty and/or Ardersier Port and offshore Project area transiting **through SPA**	No AEoSI
Inner Moray Firth	Non-breeding season features: Cormorant, goldeneye, goosander, greylag goose, red-breasted merganser, scaup, teal, wigeon, waterfowl assemblage	Vessels associated with construction transiting between Port of Nigg, Port of Cromarty and/or Ardersier Port and offshore Project area transiting **within 15 km of SPA**	No AEoSI
Ythan Estuary, Sands of Forvie and Meikle Loch	Non-breeding season features: Eider, pink-footed goose, waterfowl assemblage	Vessels associated with construction transiting between Port of Leith, Port of Dundee and/or Aberdeen Harbour and offshore Project area transiting **within 15 km of SPA**	No AEoSI
Outer Firth of Forth and St Andrews Bay Complex	Non-breeding season features: Black-headed gull, common gull, common scoter, eider, goldeneye, common guillemot, herring gull, black-legged kittiwake, little gull, long-tailed duck, razorbill, red-breasted merganser, red-throated diver, shag, Slavonian grebe, velvet scoter, seabird assemblage, waterfowl assemblage	Vessels associated with construction transiting between Port of Leith and/or Port of Dundee and offshore Project area transiting **through SPA**	No AEoSI
Firth of Tay and Eden Estuary	Non-breeding season features: Common scoter, cormorant, eider, goldeneye, goosander, greylag goose, long-tailed duck, pink-footed goose, red-breasted merganser, shelduck, velvet scoter, waterfowl assemblage	Vessels associated with construction transiting between Port of Leith and/or Port of Dundee and offshore Project area transiting **within 15 km of SPA**	No AEoSI
Firth of Forth	Non-breeding season features: Common scoter, cormorant, eider, goldeneye, great crested grebe, long-tailed duck, mallard, pink-footed goose, red-breasted merganser, red-throated diver, Sandwich tern (passage), scaup, shelduck, Slavonian grebe, velvet scoter, wigeon, waterfowl assemblage	Vessels associated with construction transiting between Port of Leith and/or Port of Dundee and offshore Project area transiting **within 15 km of SPA**	No AEoSI

Site Name (SPA)	Qualifying Features	Theoretical connectivity	Conclusion
Caithness and Sutherland Peatlands	Breeding: **Red-throated diver,** Black-throated diver, Eurasian wigeon, Common scoter, Hen harrier, Golden eagle, Merlin, European golden plover, Common greenshank, Wood sandpiper, Short-eared owl, Dunlin	Vessels associated with cable laying operations **in the export cable corridor** during construction	No AEoSI
Hoy	Breeding: **Red-throated diver**, Northern fulmar*, Peregrine falcon, Arctic skua*, Great skua, Great black-backed gull*, Black-legged kittiwake*, Common guillemot*, Atlantic puffin*	Vessels transiting through Scapa Flow SPA, which is **functionally linked** to Hoy SPA	No AEoSI
Orkney Mainland Moors	Breeding: **Red-throated diver**, Hen harrier, Short-eared owl; Wintering: Hen harrier	Vessels transiting through Scapa Flow SPA, which is **functionally linked** to Hoy SPA	No AEoSI

7.1.4 SPAs with migratory species features for which LSE could not be ruled out due to collision risk

1797. A total of 192 SPAs, listed below, were screened in due to LSE not being ruled out for the risk of migratory species features colliding with WTGs during operation. A conclusion of no AEoSI was reached for all these SPAs, for this impact pathway.

1798. Abberton Reservoir, Abernethy Forest , Achanalt Marshes, Aird and Borve, Benbecula, Alde-Ore Estuary, Antrim Hills, Arran Moors, Assynt Lochs, Avon Valley, Bae Caerfyrddin/ Carmarthen Bay, Beinn Dearg, Belfast Lough, Ben Alder, Ben Wyvis, Benfleet and Southend Marshes, Berwyn, Black Cart, Blackwater Estuary (Mid-Essex Coast Phase 4), Bluemull and Colgrave Sounds , Bowland Fells, Breydon Water, Bridgend Flats, Islay, Broadland, Burry Inlet, Caenlochan, Cairngorms, Caithness Lochs, Cameron Reservoir, Carlingford Lough, Castle Loch, Lochmaben, Chesil Beach and The Fleet, Chew Valley Lake, Chichester and Langstone Harbours, Coll, Coll (corncrake), Coll and Tiree, Colne Estuary (Mid-Essex Coast Phase 2), Creag Meagaidh, Cromarty Firth, Dengie (Mid-Essex Coast Phase 1), Din Moss - Hoselaw Loch, Dornoch Firth and Loch Fleet, Dorset Heathlands, Drumochter Hills, Dungeness, Romney Marsh and Rye Bay, Dyfi Estuary / Aber Dyfi, East Mainland Coast, Shetland, East Sanday Coast, Eilean na Muice Duibhe (Duich Moss), Elenydd – Mallaen , Eoligarry, Barra, Exe Estuary, Fala Flow, Falmouth Bay to St Austell Bay, Forest of Clunie, Foulness (Mid-Essex Coast Phase 5), Gibraltar Point, Gladhouse Reservoir, Glen App and Galloway Moors, Glen Tanar, Greater Wash, Greenlaw Moor, Gruinart Flats, Islay, Hamford Water, Holburn Lake and Moss, Horn Head to Fanad Head, Hornsea Mere, Humber Estuary, Inner Clyde Estuary, Inverpolly, Loch Urigill and nearby Lochs, Killough Bay, Kilpheder and Smerclate, South Uist, Kintyre Goose Roosts, Knapdale Lochs, Laggan, Islay, Lairg and Strath Brora Lochs, Langholm - Newcastleton Hills, Larne Lough, Lee Valley, Lewis Peatlands, Lindisfarne, Liverpool Bay / Bae Lerpwl, Loch Ashie, Loch Eye, Loch Flemington, Loch Ken and River Dee Marshes, Loch Knockie and Nearby Lochs, Loch Leven, Loch Lomond, Loch Maree, Loch of Inch and Torrs Warren, Loch of Kinnordy, Loch of Lintrathen, Loch of Skene, Loch of Strathbeg, Loch Ruthven, Loch Shiel, Loch Spynie, Loch Vaa, Lochnagar, Lochs of Spiggie and Brow, Lough Foyle, Lough Neagh and Lough Beg, Lower Derwent Valley, Martin Mere, Medway Estuary and Marshes, Mersey Estuary, Mersey Narrows and North Wirral Foreshore, Migneint-Arenig-Dduallt, Minsmere-Walberswick, Mointeach Scadabhaigh, Monach Islands, Montrose Basin, Moray and Nairn Coast, Morecambe Bay and Duddon Estuary, Muir of Dinnet, Muirkirk and North Lowther Uplands, Nene Washes, Ness and Barvas, Lewis, New Forest, North Inverness Lochs, North Norfolk Coast, North Orkney, North Pennine Moors, North Sutherland Coastal Islands, North Uist Machair and Islands, North York Moors, Northern Cardigan Bay / Gogledd Bae Ceredigion, Northumbria Coast, Oronsay and South Colonsay, Otterswick and Graveland, Ouse Washes, Outer Ards, Outer Thames Estuary, Pagham Harbour, Papa Stour, Peak District Moors (South Pennine Moors Phase 1), Pettigoe Plateau, Poole Harbour, Portsmouth Harbour, Rannoch Lochs, Rathlin Island, Renfrewshire Heights, Ribble and Alt Estuaries, Rinns of Islay, River Spey - Insh Marshes, Rutland Water, Salisbury Plain, Severn Estuary, Slamannan Plateau, Sléibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast), Slieve Beagh - Mullaghfad - Lisnaskea, Solent and Southampton Water, Solway Firth, Somerset Levels and Moors, Sound of Gigha, South Pennine Moors Phase 2, South Tayside Goose Roosts, South Uist Machair and Lochs, South West London Waterbodies, Stodmarsh, Stour and Orwell Estuaries, Strangford Lough, Strath Carnaig and

Strath Fleet Moors, Switha, Teesmouth and Cleveland Coast, Thames Estuary and Marshes, Thanet Coast and Sandwich Bay, The Dee Estuary, The Swale, The Wash, Tiree (corncrake), Tory Island, Traeth Lafan/ Lavan Sands, Conway Bay, Treshnish Isles, Upper Lough Erne, Upper Nene Valley Gravel Pits, West Coast of the Outer Hebrides, West Inverness-shire Lochs, Wester Ross Lochs, Westwater.

7.2 Derogation and compensation considerations

1799. Following the above assessment, the Project has concluded no AEoSI for all features and sites that were screened into the Addendum to the RIAA, with the exception of the following for which it was not possible to conclude no AEoSI:

- the guillemot feature at Sule Skerry and Sule Stack SPA due to Project alone and in-combination impacts;
- the kittiwake feature at North Caithness Cliffs SPA due to in-combination impacts (with and without Berwick Bank); and
- the kittiwake feature at East Caithness Cliffs SPA due to in-combination impacts (with and without Berwick Bank).

1800. In principle compensation has been proposed for these features in **Compensation Measures Plan**.

1801. In addition, the Applicant is aware that Scottish Ministers could be minded to conclude AEoSI for other SPAs for which the Applicant has reached conclusions of no AEoSI (i.e., those SPAs for which a conclusion of AEoSI was reached in the GreenVolt Appropriate Assessment). Therefore, the compensation also makes allowance, without prejudice, for possible additional compensation requirements in line with these previous determinations. Further details on the proposed compensation measures are provided in **Compensation Measures Plan**.

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ABBREVIATIONS

Acronym	Definition
AOB	Apparently Occupied Burrows
AON	Apparently Occupied Nests
AOS	Apparently Occupied Sites
AOT	Apparently Occupied Territories
AR	Avoidance Rate
BDMPS	Biologically Defined Minimum Population Scales
CEF	Cumulative Effects Framework
CFP	Common Fisheries Policy
CGR	Counterfactual of Growth Rate
CI	Confidence Interval
CIEEM	Chartered Institute of Ecology and Environmental Management
CFP	Common Fisheries Policy
CPS	Counterfactual of Population Size
CRM	Collision Risk Model/Modelling
CV	Coefficient of Variation
DAS	Digital Aerial Surveys
DSLP	Development Specification and Layout Plan
DSM	Density Surface Models
ECC	Export Cable Corridor
EEA	European Economic Area
EIA	Environmental Impact Assessment
EMF	Electro-Magnetic Fields
ESAS	European Seabirds at Sea
HDD	Horizontal Directional Drilling
HiDef	HiDef Aerial Surveying Limited
HVAC	High Voltage Alternating Current
HPAIV	Highly Pathogenic Avian Influenza Virus
HRA	Habitats Regulation Appraisal

Acronym	Definition
ICES	International Council for the Exploration of the Seas
IND	Individuals
IOF	Important Ornithological Features
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
LAT	Lowest Astronomical Tide
LCI	Lower Confidence Interval
LMP	Lighting and Marking Plan
MD-LOT	Marine Directorate – Licensing Operations Team
MHWS	Mean High Water Spring
MLS	Most Likely Scenario
MM	Mean Maximum
MS-LOT	Marine Scotland – Licensing Operations Team
MSL	Mean Sea Level
MSP	Mean Seasonal Peak
NAF	Nocturnal Activity Factor
NMPi	Marine Directorate's National Marine Planning Interactive
NSVMP	Navigational Safety and Vessel Management Plan
OAA	Option Agreement Area
OSPs	Offshore Substation Platforms
OWF	Offshore Wind Farm
OWPL	Offshore Wind Power Limited
PFOWF	Pentland Firth Offshore Wind Farm
PMFs	Priority Marine Features
PVA	Population Viability Analysis
RIAA	Report to Inform an Appropriate Assessment
RSPB	Royal Society for the Protection of Birds
SA	Sandeel Area
ScotMER	Scottish Marine Energy Research

Acronym	Definition
sCRM	stochastic Collision Risk Modelling
SD	Standard Deviation
SDM	Species Distribution Model/Surface Density Model
SMP	Seabird Monitoring Programme
SNCB	Statutory Nature Conservation Bodies
SNH	Scottish Natural Heritage
SOSS	Strategic Ornithological Support Services
SPA	Special Protection Area
THC	The Highland Council
UCI	Upper Confidence Interval
USB	Universal Serial Bus
UXO	Unexploded Ordnance
WCS	Worst-Case Scenario
WeBS	Wetland Bird Survey
WTGs	Wind Turbine Generators

GLOSSARY

Term	Definition
Biologically Defined Minimum Population Scales (BDMPS)	A proportion of a biogeographic population present in a defined area. Nonbreeding BDMPS considered suitable for use in this EIA chapter are proportions of biogeographic populations with connectivity to UK North Sea waters during the nonbreeding season.
Biogeographic population	A group of birds which breed in a particular location (or group of locations), breed freely within the group, and rarely breed or exchange individuals with other groups.
Biogeographic populations with connectivity to UK waters	The sum of bird numbers in the UK population plus each overseas population known to visit UK waters either to winter or during migration to winter quarters elsewhere (including adult and immature birds).
Breeding (full period) season	Period of months when adult birds return to colonies in the 'spring' to the time of departure from colonies at the end of the breeding season. Includes months when some birds are on breeding grounds while other birds of the same species are travelling to or from the colonies on migration.
Breeding (migration-free) season	Core breeding months only; this season does not include months when some birds of the same species may be on migration.
Collision Risk Model (CRM)	Quantitative means to estimate the number of predicted collisions between seabirds recorded in the WOW OAA from rotating WTGs.
Diadromous fish	Fish that migrate between freshwater and marine environments to fulfil their lifecycle
Competent authority	Authority granting consent.
European site	Special Areas of Conservation (SAC), Special Protection Areas (SPAs) and Sites of Community Importance (SCI) that were originally designated under EU legislation. Prior to the UK's withdrawal from the EU, the UK's European sites contributed to the Natura 2000 and were referred to as Natura 2000 sites. They now are part of the UK's National Site Network.
Habitats Regulations	Collectively the term used to refer to the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) - applicable to Marine Licence applications out to the 12 nautical mile (NM) limit, the Conservation of Offshore Marine Habitats and Species Regulations 2017 – applicable to Marine Licence applications between the 12 and 200 NM limits, and the Conservation of

Term	Definition
	Habitats and Species Regulations 2017 (as amended) – applicable to Section 36 Consent applications.
Habitats regulations appraisal	Process of the identification and assessment of the potential for a development to have an adverse effect on the integrity on a European site.
LSE	Any effect of a plan or project that may affect the conservation objectives of the qualifying features for a European site which cannot be ruled out on the basis of objective information, either individually or in combination with other plans and projects (Tyldesley *et al.*, 2015).
Offshore Project	The entire offshore Project, including all offshore components seaward of mean high-water springs (MHWS) (turbines, cables, foundations, offshore substation platform and all other associated infrastructure) and all project stages from development to decommissioning.
Population Viability Analysis	Modelling methods used to explore and understand potential consequences of additional mortality on populations.
Project	The entire offshore and onshore Projects, including all offshore components and onshore components and all project stages from pre-construction to decommissioning to which the EIA relates.