Environmental Impact Assessment Report
Volume 1, Chapter 12: Offshore and Intertidal Ornithology

MarramWind Offshore Wind Farm

December 2025

MarramWind

Document code:	MAR-GEN-ENV-REP-WSP-000102
Contractor document number:	852346-WEIS-IA-O1-RP-O6-966019
Version:	Final for Submission
Date:	08/12/2025
Prepared by:	APEM Ltd
Checked by:	WSP UK Limited
Accepted by:	MarramWind Limited

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12. Offshore and Intertidal Ornithology

12.1 Introduction

12.1.1.1 This offshore and intertidal ornithology Chapter of the Environmental Impact Assessment (EIA) Report presents the results of the assessment of the likely significant effects on offshore and intertidal ornithology receptors that may arise from the construction, operation and maintenance (O&M) and decommissioning of the offshore MarramWind Offshore Wind Farm (hereafter, referred to as 'the Project') seaward of Mean High Water Springs (MHWS).

12.1.1.2 Offshore ornithology receptors are primarily species colloquially referred to as seabirds, so this aggregate term is used in this Chapter in reference to birds that are well adapted to the marine environment and spend much of their time at sea and / or near the coast. Intertidal Ornithology receptors can be made up of both seabirds and waterbirds, this aggregate term is used in this Chapter in reference to birds that are well adapted to the intertidal environment and spend much of their time coastally.

12.1.1.3 This Chapter should be read in conjunction with the project description provided in **Chapter 4: Project Description** and the relevant parts of the following chapters and appendices:

- **Chapter 6: Marine Geology, Oceanography and Physical Processes:** There are potential pathways of effect from marine processes physical parameters on potentially sensitive marine ornithological receptor species, therefore information from the marine geology, oceanography and physical processes chapter has informed the offshore and intertidal ornithology assessment.
- **Chapter 9: Electromagnetic Fields:** There is potential for electromagnetic field (EMF) emissions to affect some prey species for some offshore ornithology receptors. Therefore, the EMF chapter has informed the offshore and intertidal ornithology assessment.
- **Chapter 10: Benthic, Epibenthic and Intertidal Ecology:** Offshore and intertidal ornithology receptors may be sensitive to changes on prey resource habitats. Therefore, the benthic, epibenthic and intertidal ecology chapter has informed the offshore and intertidal ornithology assessment.
- **Chapter 13: Fish Ecology:** Offshore and intertidal ornithology receptors may be sensitive to changes in prey abundance and availability. Therefore, the fish ecology Chapter will inform the offshore and intertidal ornithology assessment.
- **Chapter 23: Terrestrial Ecology and Ornithology:** The terrestrial ecology and ornithology assessment has interlinkages with offshore and intertidal ornithology due to the presence of bird species that use both intertidal and offshore habitats.

12.1.1.4 This Chapter describes:

- the legislation, planning policy, guidance and other documentation that has informed the assessment (**Section 12.2: Relevant legislative and policy context**);
- the outcome of consultation and engagement that has been undertaken to date, including how matters relating to offshore and intertidal ornithology have been addressed (**Section 12.3: Consultation and engagement**);
- the scope of the assessment for offshore and intertidal ornithology (**Section 12.4: Scope of the assessment**);

- the data sources and methods used for gathering baseline data including surveys where appropriate (**Section 12.5: Methodology for baseline data gathering**);
- the overall environmental baseline (**Section 12.6: Baseline conditions**);
- the basis for EIA Report (**Section 12.7: Basis for the Environmental Impact Assessment Report**);
- methodology for EIA Report (**Section 12.8: Methodology for Environmental Impact Assessment Report assessment);**
- the assessment of offshore and intertidal ornithology effects (**Section 12.9: Assessment of effects: Construction stage; Section 12.10: Assessment of effects: Operation and maintenance**; **Section 12.11: Assessment of effects: Decommissioning**);
- summary of effects (**Section 12.12**);
- consideration of transboundary effects (**Section 12.13: Transboundary effects**);
- consideration of inter-related effects and cumulative effects (**Section 12.14: Inter-related effects** and **Section 12.15: cumulative effects assessment**);
- a summary of residual effects for offshore and intertidal ornithology (**Section 12.16: Summary of residual likely significant effects**);
- a reference list is provided (**Section 12.17: References**); and
- a glossary of terms and abbreviations is provided (**Section 12.18: Glossary**).

12.1.1.5 This Chapter is also supported by the following Appendices in **Volume 3**:

- **Appendix 12.1: Offshore and Intertidal Ornithology Baseline Report.** This Appendix provides the methods and subsequent results of site-specific surveys implemented to characterise the baseline environment for offshore and intertidal ornithology receptors considered within this Chapter.
- **Appendix 12.2: Offshore Ornithology Displacement Modelling.** This Appendix provides the methods and subsequent results of displacement analysis undertaken to inform impact assessments within this Chapter.
- **Appendix 12.3: Offshore Ornithology Collision Risk Modelling.** This Appendix provides the methods and subsequent results of Collision Risk Modelling (CRM) undertaken to inform impact assessments on key seabirds within this Chapter.
- **Appendix 12.4: Offshore EIA Population Viability Analysis Report.** This Appendix provides the methods and subsequent results of Population Viability Analysis (PVA) undertaken to inform impact assessments within this Chapter.
- **Appendix 12.5: MRSea Modelling Report.** This Appendix provides the methods and subsequent results of Marine Renewables Strategic Environmental Assessment (MRSea) modelling for key receptors used to inform abundance and density predictions for baseline characterisation.
- **Appendix 12.6: Offshore Ornithology Migratory Collision Risk Modelling.** This Appendix provides the methods and subsequent results of CRM undertaken to inform impact assessments on migratory birds within this Chapter.

12.2 Relevant legislative and policy context and technical guidance

12.2.1 Legislative and policy context

12.2.1.1 This Section identifies the relevant legislation and policy context that has informed the scope of the offshore and intertidal ornithology assessment. Further information on policies relevant to the EIA and their status is set out in **Chapter 2: Legislative and Policy Context**. **Chapter 2: Legislative and Policy Context** is supported by **Volume 3, Appendix 2.1: Planning Policy Framework**, which provides a detailed summary of international, national, marine and local planning policies of relevance to the EIA. Individual policies of specific relevance to this assessment and associated appendices have been taken into account.

12.2.1.2 This summary provides a foundation for understanding the specific requirements that this Chapter must address in terms of assessing and mitigating impacts on receptors and relevant environmental issues.

12.2.1.3 The legislation and international agreements relevant to offshore and intertidal ornithology include:

- The Environmental Authorisations (Scotland) Amendment Regulations 2025;
- UK Biodiversity Framework 2024;
- Convention on Biological Diversity Post-2020 Global Biodiversity Framework, 2022;
- The European Biodiversity Strategy for 2030, 2020;
- The Aichi Biodiversity Targets 2020;
- The Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019;
- The Environmental Authorisations (Scotland) Regulations 2018;
- Conservation of Offshore and Marine Habitats and Species Regulations 2017;
- Marine (Scotland) Act 2010;
- The Marine Strategy Regulations 2010;
- Marine and Coastal Access Act 2009;
- Directive (2009/147/EC) on the Conservation of Wild Birds (the ‘Birds Directive’);
- Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive (MSFD));
- Nature Conservation (Scotland) Act 2004;
- Directive (92/43/EEC) on the conservation of natural habitats and of wild fauna and flora (the ‘Habitats Directive’);
- Convention on Biological Diversity 1992;
- Convention for the Protection of the Marine Environment of the North East Atlantic (OSPAR) 1992;
- Electricity Act 1989;

- The Convention on the Conservation of Migratory Species of Wild Animals (the 'Bonn Convention') 1983;
- Wildlife and Countryside Act 1981;
- The Convention on the Conservation of European Wildlife and Natural Habitats (the 'Bern Convention') 1979; and
- Convention on Wetland of International Importance especially as Waterfowl Habitat 1971 (the 'Ramsar Convention');

12.2.1.4 The policies relevant to offshore and intertidal ornithology include:

- Draft Updated Sectoral Marine Plan (Scottish Government, 2025);
- Scottish Biodiversity Strategy to 2045 (Scottish Government, 2024a);
- The Environment Strategy for Scotland 2020 (Scottish Government, 2020a), and Progress Report 2024 (Scottish Government, 2024b);
- UK Marine Policy Statement 2011 (HM Government, 2011);
- National Planning Framework 4 (NPF4) 2023;
- Scottish National Marine Plan 2015 (Scottish Government, 2015);
- Sectoral Marine Plan for Offshore Wind 2020 (Scottish Government, 2020b);
- Aberdeenshire Council Local Development Plan 2023 (Aberdeenshire Council, 2023a); and
- Aberdeenshire Council Natural Heritage Strategy 2019-2022 (Aberdeenshire Council, 2020).

12.2.2 Relevant technical guidance

12.2.2.1 Other information and technical guidance relevant to the assessment undertaken for offshore and intertidal ornithology include:

- Chartered Institute of Ecology and Environmental Management (CIEEM) (2024), 'Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine'.
- Statutory Nature Conservation Bodies (SNCBs) (2024), 'Joint advice note from the SNCBs regarding bird collision risk modelling for offshore wind developments'.
- Planning Inspectorate (PINS) (2024), 'Advice Note Seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects'.
- NatureScot (2025a), 'Guidance Note 1: Guidance to support Offshore Wind Applications: Marine Ornithology'.
- NatureScot (2023a), 'Guidance Note 2: Guidance to support Offshore Wind Applications: Advice for Marine Ornithology Baseline Characterisation Surveys and Reporting'.
- NatureScot (2023b), 'Guidance Note 3: Guidance to support Offshore Wind Applications: Identifying theoretical connectivity with Special Protection Areas using breeding season foraging ranges'.

- NatureScot (2023c), 'Guidance Note 4: Guidance to support Offshore Wind Applications: Determining Connectivity of Marine Birds with Marine Special Protection Areas and Key Considerations for Assessment'.
- NatureScot (2023d), 'Guidance Note 5: Guidance to support Offshore Wind Applications: Recommendations for Marine Bird Population Estimates'.
- NatureScot (2023e), 'Guidance Note 6: Guidance to support Offshore Wind Applications: Marine Ornithology Impact Pathways for Offshore Wind Development'.
- NatureScot (2025b), 'Guidance Note 7: Guidance to support Offshore Wind Applications: Marine Ornithology - Advice for assessing collision risk of marine birds'.
- NatureScot (2023f), 'Guidance Note 8: Guidance to support Offshore Wind Applications: Marine Ornithology Advice for assessing the distributional response, displacement and barrier effects of Marine birds'.
- NatureScot (2023g), 'Guidance Note 11: Guidance to support Offshore Wind Applications: Recommendations for Seabird Population Viability Analysis (PVA)'.
- Woodward *et al*. (2023), Study detailing migratory bird populations and their migratory routes, population sizes, and behaviour. The document provides a strategic review of Collision Risk Modelling (CRM) input parameters, including their flight patterns, heights, and avoidance behaviour in response to structures like wind turbines.
- SNCBs (2022), 'Joint SNCB Interim Displacement Advice Note'.
- NatureScot (2020), 'Guidance Note 9: Guidance to support Offshore Wind Applications: Marine Ornithology Advice for Seasonal Definitions for birds in the Scottish Marine Environment'.
- Institute of Environmental Management and Assessment (IEMA) (2017), 'Delivering Proportionate Environmental Impact Assessment (EIA); A Collaborative Strategy for Enhancing UK Environmental Impact Assessment Practice'.

12.3 Consultation and engagement

12.3.1 Overview

12.3.1.1 This Section describes the consultation and stakeholder engagement undertaken on the Project in relation to offshore and intertidal ornithology. This includes early engagement, the outcome of and response to the Scoping Opinions (Scottish Government, 2023) in relation to the offshore and intertidal ornithology assessment, non-statutory consultation, and the findings of the Project's Statutory Consultation. An overview of engagement undertaken for the Project as a whole can be found in Section 5.5 of **Chapter 5: Approach to the EIA**.

12.3.2 Key issues

12.3.2.1 A summary of the key issues raised during statutory and non-statutory consultation, specific to offshore and intertidal ornithology, is outlined below in **Table 12.1,** together with how these issues have been considered in the production of this EIA Report.

Table 12.1 Stakeholder issues responses – offshore and intertidal ornithology

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
MD-LOT	218	29 September 2022, Offshore EIA Scoping workshop stakeholder engagement meeting.	*"The Project is to set out clearly in EIA how they have approached data interpretation in light of Avian flu."*	The Project has further engaged on the treatment and interpretation of Highly Pathogenic Avian Influenza (HPAI) within EIA as detailed within stakeholder ID 871.
MD-LOT	219	29 September 2022, Offshore EIA Scoping workshop stakeholder engagement meeting.	*"Scoping Report or baseline technical note to detail definition of precision estimates reported in the digital aerial report."*	Definition of precision and methodology of how such an estimate is calculated is provided within **Volume 3, Appendix 12.1**.
NatureScot	230	29 September 2022, Offshore EIA Scoping workshop stakeholder engagement meeting.	*"Displacement - the Project proposes an evidence-based approach (e.g. using post-consent monitoring studies) - displacement matrix is proposed to deriving displacement. NatureScot notes SeabORD as appropriate for use and asks for written questions to include a justification for why SeabORD is not suitable. NatureScot notes other projects are using SeabORD."*	As outlined in stakeholder ID 962 the Project has further engaged on the appropriateness of using SeabORD for the Project.
MD-LOT	231	29 September 2022, Offshore EIA Scoping workshop stakeholder engagement meeting.	*"Previous projects have reviewed kittiwake and found no difference between pre- and post-monitoring, and even a weak attraction in some cases. The Project suggests that kittiwake may not be susceptible to disturbance and displacement. The Project asks if species exclusion from guidance is being considered. NatureScot says that this is not being considered and that kittiwake remains in guidance as should be considered."*	The Applicant remains of the position that there is no requirement to assess kittiwake for distributional response effects based on the information presented within **Section 12.10.2**. However, an assessment of distributional responses has been undertaken for kittiwake to conform with NatureScot's Guidance Note 8 (NatureScot, 2023f).

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
NatureScot	237	29 September 2022, Offshore EIA Scoping workshop stakeholder engagement meeting.	*"Digital aerial survey: NatureScot notes that many surveys were undertaken in the afternoon. NatureScot asks for surveys to have a good balance of morning/afternoon flight times."*	Details on survey timings of the 24 digital aerial surveys (DAS) completed for the Project are provided in **Volume 3, Appendix 12.1**. Surveys contained a mixture of both morning and afternoon flights as requested.
NatureScot	238	29 September 2022, Offshore EIA Scoping workshop stakeholder engagement meeting.	*"NatureScot queried the degree to which floating turbines will move vertically and laterally and to report upon how this is accounted for in collision risk modelling."*	The latest iteration of the stochastic collision risk model (sCRM) (Caneco and Humphries, 2022) recommended for modelling does not take into account the location of individual turbines and therefore any minor lateral movement of turbines do not require consideration within modelling. As the chains will be under constant tension, there is the potential for the air gap between the sea surface and minimum blade tip height to change with the tide. This has been accounted for within the model via the inclusion of a tidal offset value as is standard practice within modelling.
MD-LOT	320	12 May 2023, MD-LOT Scoping Opinion (Scottish Government, 2023).	*"5.8.1 The Scottish Ministers are content with the study area and buffer defined for both the offshore ornithology and intertidal ornithology receptors in Figure 5.7.1 of the Scoping Report, which was previously been agreed with NatureScot."*	The Project welcomes this agreement.
MD-LOT	321	12 May 2023, MD-LOT Scoping Opinion	*"5.8.2 The Scottish Ministers, in line with the NatureScot representation are broadly content with the proposed approach*	On receival of this advice, the Project has completed intertidal surveys for a full calendar year (12

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
		(Scottish Government, 2023).	*for the baseline technical report which is set out in section 5.7.63 of the Scoping Report, including the proposed methods and buffers. However, The Scottish Ministers do not agree with the approach to surveys for the intertidal region and advise that a full calendar year of intertidal bird surveys, ideally taking place over 12 consecutive months, is required for baseline characterisation. This is in line with the NatureScot representation."*	consecutive months of survey for the short-listed landfall sites). Details on the intertidal surveys completed for the Project are provided within **Volume 3, Appendix 12.1**.
MD-LOT	322	12 May 2023, MD-LOT Scoping Opinion (Scottish Government, 2023).	*"5.8.3 Regarding the missed surveys during the year one digital aerial surveys, The Scottish Ministers, in line with the NatureScot representation recommend that maximum monthly density estimates are used for the assessment, rather than the mean, as a more precautionary approach due to the missing data."*	Post scoping the Project has further engaged with stakeholders on the approach to baseline characterisation relating to missed survey months as noted within stakeholder ID 682. Despite the missed surveys, the Project has collected a total of 24 site-specific surveys across the two-year DAS survey programme.
MD-LOT	323	12 May 2023, MD-LOT Scoping Opinion (Scottish Government, 2023).	*"5.8.4 The Scottish Ministers are broadly content that the relevant sources have been identified in Table 5.7.7 of the Scoping Report but advise that the Buckingham et al. (2022) paper highlighted by NatureScot will be a key resource that should be used to inform the desk-based study undertaken as part of the EIA Report."*	Relevant data sources to inform assessment are provided within **Table 12.5**, which includes Buckingham *et al.* (2022).
MD-LOT	324	12 May 2023, MD-LOT Scoping Opinion (Scottish Government, 2023).	*"5.8.5 Regarding the approach to assessment, the Scottish Ministers advise that MRSea should be used for density modelling approaches, in line with the NatureScot representation. The NatureScot representation regarding the use of MRSea must be addressed in full by the Developer in the EIA Report. Regarding seasonal definitions The Scottish Ministers advise*	The Project has used MRSea to inform baseline characterisation as requested where feasible. The details of MRSea modelling completed for the Project are provided within **Volume 3, Appendix 12.5**.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			that the NatureScot guidance should be used for the assessment. The Scottish Ministers do not agree with the request to refine seasonal definitions for the Project and the NatureScot advice in this regard must be addressed by the Developer in the EIA Report. The Scottish Ministers advise that the NatureScot representation regarding reference populations and demographic rates for population viability analysis is addressed in full in the EIA Report."	The seasonal definitions used to inform assessments follow the advice provided within NatureScot's Guidance Note 9 (NatureScot, 2020) with no seasonal refinement. The reference populations and demographic rates used to inform assessments are in accordance with the recommendations provided for stakeholder ID 961.
MD-LOT	325	12 May 2023, MD-LOT Scoping Opinion (Scottish Government, 2023).	*"5.8.6* *The Scottish Ministers are broadly content that standard pathways of collision, disturbance, displacement, and barrier effects have been identified in Table 5.7.10 of the Scoping Report and agree with the decision to scope out operational disturbance and displacement within the offshore export cable corridor. However, the Scottish Ministers disagree with barrier effects being scoped out. In line with NatureScot's representation, barrier effects and displacement can be dealt with together in the assessment as it is acknowledged that the two can be difficult to separate. In addition, barrier impacts to migrating birds should be scoped in, and Marine Scotland's updated strategic assessment of collision risk of Scottish offshore wind farms to migrating birds should be utilised if available."*	The Project welcomes MD-LOT's broad agreement on effect pathways for assessment. The Project can confirm that the Marine Scotland's updated strategic assessment of collision risk of Scottish offshore wind farms to migrating birds has been utilised to inform assessments presented within **Section 12.10**. The details of migratory collision risk undertaken for the Project are provided within **Volume 3, Appendix 12.6**. In relation to barrier effects to migrating birds, assessment of such a potential effect is provided within **Section 12.10.2**.
MD-LOT	326	12 May 2023, MD-LOT Scoping Opinion	*"5.8.7* *The Scottish Ministers recommend that based on findings from*	On completion of the 24 months of DAS, the Project has completed a

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
		(Scottish Government, 2023).	*the year 1 Digital Aerial Survey, storm petrel and great skua may need further consideration in the EIA Report depending on year two survey findings. At this stage, no species should be scoped out, due to year 1 data being incomplete."*	screening exercise to determine which receptors require assessment for identified effect pathways as presented within **Table 12.17**. This exercise accounts for a receptor's expected sensitivity to an effect pathway, conservation value, frequency and abundance of the receptor within the study area. Based on other comments received regarding detection of storm petrels in DAS, the Project has utilised additional desk-based sources to provide contextualisation of the expected usage of the Project area by the species as provided within **Section 12.6**. To note the Project has full confidence in the survey approach selected to detect storm petrels due to DAS data being collected at a ground sampling distance (GSD) of 1.5cm. In relation to great skua, the receptor was recorded in a total of four surveys only with low predicted abundance for those months with the exception of August 2021. However, the predicted abundance was likely inflated due to the attraction effect of a fishing vessel during the August 2021 survey, as great skuas were observed following the vessel.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
				Both species have been considered in this Chapter.
MD-LOT	327	12 May 2023, MD-LOT Scoping Opinion (Scottish Government, 2023).	*"5.8.8 The Scottish Ministers confirm that, in line with Natural England representation, all ornithology impacts relating to English waters or English designated sites have been adequately considered within the Scoping Report."*	The Project welcomes this agreement.
MD-LOT	328	12 May 2023, MD-LOT Scoping Opinion (Scottish Government, 2023).	*"5.8.9 The Scottish Ministers confirm in line with the NatureScot representation, the proposed approach to reference populations for use in the EIA Report is generally appropriate. The Scottish Ministers highlight that further advice on recommendations for marine bird population estimates and various scenarios, as well as details of site-specific reference populations for marine special protection area's is available in NatureScot Guidance Note 5. Additionally, The Scottish Ministers advise that the RSPB representation regarding population modelling is addressed by the Developer in the EIA Report."*	As outlined in stakeholder ID 961 the Project has further engaged on the approach to population estimation to inform impact assessments. The Project has responded to the RSPB's representation within stakeholder ID 399.
MD-LOT	329	12 May 2023, MD-LOT Scoping Opinion (Scottish Government, 2023).	*"5.8.10 Regarding displacement analysis The Scottish Ministers recommend the use of the displacement and mortality rates presented within the Joint Statutory Nature Conservation Bodies ("SNCB") Interim Displacement Advice Note. The Developer should note that NatureScot's review of the application will be based on the SNCB agreed displacement and mortality rates and that any other rates presented will not form the basis of NatureScot's assessment of the application. Additionally, the Scottish Ministers advise that an assessment for displacement should be undertaken for kittiwake and that impacts for both kittiwake and gannet for displacement and collision are also considered. Finally, the Scottish Ministers*	As outlined in stakeholder ID 962 the Project has further engaged on the appropriateness of using SeabORD for the Project. The Project has reviewed all available evidence in relation to kittiwake distributional responses as presented within **Section 12.10.2** and remain of the position that there is no requirement to assess kittiwake for distributional response effects. The Project would welcome

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			advise that SeabORD should be used to undertake an assessment of puffin, guillemot, razorbill, and kittiwake and that the matrix approach should be used to assess these species outside of the chick rearing period. The NatureScot representation regarding displacement analysis should be addressed in full by the Developer in the EIA Report."	feedback from stakeholders on whether they agree with the conclusion drawn by the Project, based on the evidence provided. Distributional response assessments have been undertaken following the recommendations within NatureScot's Guidance Note 8 (NatureScot, 2023) referred to as the 'Guidance' approach, which includes consideration of kittiwake. An alternative approach is also presented referred to as the 'Developer' approach presenting the most likely impact of distributional response effects on key receptors, based on critical appraisal of all available evidence relating to displacement effects on key receptors as summarised in **Section 12.10.2**.
MD-LOT	330	12 May 2023, MD-LOT Scoping Opinion (Scottish Government, 2023).	*"5.8.11* *Regarding collision risk, The Scottish Ministers are content with the proposed approach to using the stochastic collision risk model ("sCRM") but advise that the 2022 update to the sCRM tool is used in line with NatureScot representation. This update should also be used to run deterministic output with values specified. Outputs for both stochastic and deterministic collision risk models must be presented using this tool. Regarding species, the Scottish Ministers advise that year two digital aerial surveys should also influence this list of species. Great skua should additionally be taken forward for collision risk assessment based on the numbers recorded during year 1*	The full two years of DAS data has been used to identify species requiring collision risk assessment as presented within **Section 12.8.3**. Since Scoping there have been significant updates to collision risk modelling best practice, which the Project has discussed further with key stakeholders. The final agreed approach for the Project follows the recommendations within NatureScot's Guidance Note 7

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			digital aerial surveys, in line with NatureScot representation. Additionally, the NatureScot and RSPB representation regarding flight height, flight height distribution, avoidance rates and flight type for gannet must be addressed in full by the Developer. Finally, the Scottish Ministers do not endorse the adjustment of densities to resolve over estimation of predicted impacts for gannet, in line with the NatureScot representation."	(NatureScot, 2025b) to inform modelling.
MD-LOT	331	12 May 2023, MD-LOT Scoping Opinion (Scottish Government, 2023).	*"5.8.12 The Scottish Ministers agree that the Natural England Population Viability Analysis ("PVA") tool, as referenced in paragraph 5.7.99 of the Scoping Report, should be used to undertake PVA assessment. The Scottish Ministers advise that the NatureScot advice in this regard is addressed in full in the EIA Report."*	As outlined in stakeholder ID 399, 467, 972 the Project has further engaged on the approach to PVA.
MD-LOT	332	12 May 2023, MD-LOT Scoping Opinion (Scottish Government, 2023).	*"5.8.13 The Scottish Ministers are broadly content with the proposed approach towards cumulative assessment but disagree with the Developer's decision to scope out cumulative impacts during the construction and decommissioning stages. At this stage, the Scottish Ministers advise these impacts should be scoped in. This is in line with NatureScot's advice. The Scottish Ministers advise that Cumulative Effects Framework should be used when available."*	As outlined in stakeholder ID 870 the Project has further engaged on the approach to cumulative assessment.
MD-LOT	333	12 May 2023, MD-LOT Scoping Opinion (Scottish Government, 2023).	*"5.8.14 The Scottish Ministers recommend that the Developer engages further with Marine Scotland and NatureScot on the proposed approach to transboundary impacts following the submission of the MarramWind Habitats Regulations Appraisal (HRA) Screening Report and final Ornithology Baseline Report. The Scottish Ministers highlight the NatureScot representation that it is likely that impacts will occur to seabird populations that breed outside Scotland."*	Please refer to stakeholder ID 473 in relation to Transboundary assessments.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
MD-LOT	334	12 May 2023, MD-LOT Scoping Opinion (Scottish Government, 2023).	*"5.8.15 The Scottish Ministers highlight the representation from RSPB Scotland that the preference for any impact assessment information based on parameters and methods other than those specified in the Scoping Opinion to be referred to as 'the Developer approach' within the EIA Report, to avoid confusion with those impacts assessed using the recommended parameters and methods."*	Two approaches are presented within this Chapter, a 'Developer' approach taking an evidence-based approach to impact assessments to inform the most likely impact and a 'Guidance' approach which relies on the recommendations within NatureScot's guidance notes.
RSPB	399	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"We advise the two-ratio metrics generally termed 'Counterfactual of population size' (CPS) and 'Counterfactual of population growth-rate' (CPGR) are presented. The CPS is especially important to aid understanding of impacts for a non-specialist whereas the numbers given by the CPGR are less understandable beyond a population modelling context. We suggest for each impacted Special Protection Area (SPA), a summary section is included which includes the ratio of impacts to unimpacted population growth rate and puts this into context of the lifetime of the windfarm (e.g. This means that after x-year lifetime of the Offshore Wind Farm, the population size of the SPA is expected to be between min% and max% of what it would have been in the absence of the development)."*	Where PVA has been undertaken to inform assessments both the CPS and CPGR are presented as requested though the Project strongly disagrees with the RSPB's rationalisation regarding the use of the CPS. A detailed explanation of this disagreement is provided within **Volume 3, Appendix 12.4**.
RSPB	400	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"It is inevitable that the Environmental Statement and Report to Inform Appropriate Assessment (RIAA) will be complex and contain data, specialist models, and detailed analysis. Nevertheless, we welcome this being set out in a clearly logical way so the process, if not the details of the process, can be followed by the lay-person (and decision-maker) and easily scrutinised by technical experts. Applicants can (and do) provide impact assessment information based on parameters and methods other than those specified in the scoping opinion. We encourage this to be referred to as 'the developer*	Please refer to stakeholder ID 334.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			approach' to avoid confusion with impact assessed using the recommended parameters and methods."	
NatureScot	456	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"In general the proposed approach aligns with our guidance. However, some proposed approaches/ methods deviate, in particular we do not endorse the approach outlined for displacement assessment, and we recommend the use of tools such as MRSea and SeabORD."*	As outlined in stakeholder ID 461, 962 the Project has further engaged on the approach to MRSea and SeabORD.
NatureScot	457	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"Key species* *Results from the first 10 monthly Digital Aerial Surveys (DAS) show that the following species are most abundant in the region: guillemot, razorbill, fulmar, gannet, and kittiwake. Storm petrel and great skua also appear to be present in moderate numbers in the late summer, and great black-backed gull (GBBG) in winter. The report states that these have been statistically analysed, but it is not clear how this analysis has been undertaken so our advice is provided based on an assumption that design-based methods have been used to produce abundance estimates.* *The Scoping Report identifies the following species as likely to require assessment:* *Kittiwake* *GBBG* *Herring gull* *Common guillemot* *Razorbill* *Puffin* *Gannet* *Based on findings from the year 1 DAS, storm petrel and great*	Please refer to stakeholder ID 326 in relation to storm petrel and great skua.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			skua may need to be taken forward for consideration, depending on year two survey findings. At this stage we advise that no species are scoped out, due to year 1 data being incomplete."	
NatureScot	458	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"Study area* *We are content with the overall study area as proposed in Section 5.7.6-7 and Figure 5.7.1, which is broadly comprised of the Option Agreement Area (OAA) and offshore export cable corridor search area.* *This overall area is used to define two specific study areas: Offshore ornithology study area; and Intertidal ornithology study area"*	The Project welcomes this agreement.
NatureScot	459	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"Offshore ornithology study area* *This study area is comprised of the offshore scoping boundary, plus a 4km buffer around the OAA, and includes the nearshore environment seaward of MHWS. Ornithology data was collected via a site-specific Digital Aerial Survey (DAS) campaign within the OAA and 4km buffer, as previously agreed with NatureScot."*	The Project welcomes agreement of the study area for the OAA and 4 km buffer, with details of survey methods and data collected detailed in **Volume 3, Appendix 12.1** and summarised in **Section 12.5.3**.
NatureScot	460	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"Intertidal ornithology study area* *This study area is comprised of the coastal area between MHWS and MLWS at the proposed landfall locations. It includes a 500m survey buffer extending seawards of MHWS."*	The Project welcomes agreement of the study area for the OAA and 4 km buffer, with details of survey methods and data collected detailed in **Volume 3, Appendix 12.1** and summarised in **Section 12.5.3**.
NatureScot	461	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation	*"Baseline characterisation and approach to assessment* Applicants Scoping questions (from Section 5.7.65) *Do you agree that the above information being made available*	As outlined in stakeholder ID 321 the Project has committed to 12 consecutive months of intertidal

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
		Responses & Advice (Scottish Government, 2023).	*would be sufficient to appropriately characterise the baseline environment for offshore and intertidal ornithology? If the answer is no, please provide details of any additional information that would be required.* *Do you agree that population modelling using MRSea to determine seabird abundance and density estimates is not required for the Project?* *NatureScot response:* *We generally support the proposed approach for the baseline technical report, and confirm that surveys use appropriate methods and buffers. One exception to this is the stated intention to survey the intertidal region (for cable landfalls) only during the non-breeding season. We have confirmed (by email dated 08 March 2023) that this approach is not sufficient, and that a full calendar year of intertidal bird surveys, ideally taking place over 12 consecutive months, is required for baseline characterisation. Additionally, two surveys were missed during year 1 DAS. Extra surveys are planned to make up for those missed during the appropriate months, but we recommend that maximum monthly density estimates are used for the assessment, rather than the mean, as a more precautionary approach due to this missing data.* *Given the offshore location of this proposal, it is likely that the Buckingham et al. (2022) paper will be a key resource for the desk-based study undertaken for EIA.* *The applicant proposes to not use MRSea to produce density and abundance methods – opting instead to use design-based methods. This proposed approach is based on the location of the project and the environmental covariates commonly used for MRSea including bathymetry, distance to shore etc, due to relatively deep and uniform depth of water of the proposal's location. They also state that it is apparent from the year 1*	surveys for the short-listed landfall sites. With regard to missed survey month approach the Project has further engaged with NatureScot as detailed in stakeholder ID 696. The Project can confirm Buckingham *et al.* (2022) has been considered where appropriate to inform assessments. The Project has utilised MRSea as requested to inform impact assessments where feasible. Further details of MRSea modelling are provided within **Volume 3, Appendix 12.5**.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			DAS dataset that the majority of raw count data are so low as to mean it would be difficult or not possible to run MRSea in a meaningful manner. We do not support these justifications for not using MRSea, and we advise that MRSea should be used for density modelling approaches, as per our Guidance Note 25. In addition, we note that low count data may be a symptom of missed surveys from the year 1 DAS (see above). However, if the number of data points for a species is less than 10, or the species are present in a uniform distribution it may not be possible to run the spatial element of MRSea. If this applies, we will require this explanation to be set out for any relevant species and design-based estimates can be used. The applicant has not presented the raw counts, so we are unable to comment on this further at this stage, but generally our position is that MRSea should be applied wherever possible.”	
NatureScot	462	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*“Seasonal definitions* *Scoping questions (from Section 5.7.73) Do you agree the proposed seasons presented in Table 5.7.11 match the SNCB generic seasonal guidance based on NatureScot (2020) for assessment?* *Do you agree that based on review of the first year of data for the project, there is potential that refinements to the seasonal definitions based on NatureScot (2020) guidance note is appropriate for the Project?* *We confirm that our seasonal definitions guidance should be used for the assessment. In general we advise that where surveys require a cut-off date for the middle of the month that the 15th/16th of the month is used. The report states the proposed approach for kittiwake is to present the assessment using two and three season options; using two seasons defined by NatureScot guidance and three seasons by incorporating the migratory periods pre- and post-breeding*	The Project can confirm that the seasons recommended within NatureScot's Guidance Note 9 (NatureScot, 2020) have been used by the Project to inform seasonal definitions for assessment. In relation to half months the Project has generally followed the advice of splitting months around the 15th / 16th of the month when assigning impacts. Where exceptions to this rule are deemed appropriate, the Project has clearly set out the rationale within **Volume 3, Appendix 12.2**.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			defined in Furness (2015). This is suggested to maximise interpretation of peak abundance estimates and behaviour over the study area of this species. For gannet, three seasons are proposed to account for extensive population movements occurring during migratory periods. *The report states that based on the first year of survey that refinements to the seasonal definitions might be appropriate. However, to agree a site specific change in dates we would require approximately 5 years of temporal data for the colony or designated site, such as arrival, lay, hatch or departure dates, showing consistently different periods to those outlined in the table.* *Given the issues with missed surveys for this data set and also the temporal span of the data collection for this project it is unlikely that this project will record enough data on temporal changes at this site to provide evidence of consistency of this behaviour. We therefore do not agree with the request to refine seasonal definitions for this project."*	
NatureScot	463	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"Reference populations* *Scoping questions (from Section 5.7.79)* *Do you agree with the approach taken for deriving species regional breeding season population described above, include the exceptions described above?* *Do you agree on the use of the Seabird Monitoring Programme database for deriving the latest colony counts for all Scottish sites? If the answer is no, please provide alternative data source where the latest colony count can be derived from.* *Do you agree with the non-breeding populations being derived from Furness (2015)?* *In general the proposed approaches to reference populations for use in the EIA (and HRA) are appropriate. We refer the applicant to our full advice on recommendations for marine bird*	The Project has further engaged with NatureScot regarding deriving regional population sizes as provided within stakeholder ID 961.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			population estimates and various scenarios in Guidance note 58. Details of site-specific reference populations for marine SPAs are also available in Guidance note 5. In general we agree with the proposed approach to deriving regional breeding populations. The developer intends to use the foraging ranges (mean max +1SD) as defined in Woodward et al. (2019). They identify one important exception to this (for guillemot and razorbill), however, there is an additional exception for gannet which should be incorporated into their assessment, the specifics of which are detailed in Guidance Note 3. We confirm that the Seabird Monitoring Programme (SMP) should be used to derive latest colony counts for all Scottish sites, also noting that the national gannet census was completed during 2013-2014 and this time period should be used for gannets. With respect to correction factors for colony counts, the proposed approach is that colony counts expressed as AON (apparently occupied nest), AOT (apparently occupied territory), AOB (apparently occupied burrow) will be corrected where 1 AON = 2 breeding individuals. We confirm this is an accepted method. Additionally, for guillemots and razorbills, colony counts of individuals should be multiplied by a 1.34 to obtain a whole colony estimate11. *We confirm that non-breeding populations should be derived from Furness (2015). The exception to this is common guillemot as more recent studies show they largely remain in the broad vicinity of their breeding colonies during the non-breeding season (Buckingham et al. 2022). For this species, we advise the non-breeding season population comprises the breeding population found within the MMFR+1SD (mean max foraging range) of the development + age classes, as per our Guidance note 4. We also advise that for herring gull the regional breeding population (within mean max +1SD foraging range) with a correction factor is used as the non-breeding population. A correction factor should be applied to account for*	

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			the influx of continental breeding birds into eastern Scotland during the non-breeding season. The correction factor should be calculated from the proportions of overseas and western UK birds in the UK North Sea and Channel BDMPS (Furness 2015). In the recent application submitted for Berwick Bank - the correction factor was calculated to be 0.67 (volume 3, appendix 11.5).”	
NatureScot	464	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*“Demographic rates for PVA* *Scoping Question (from Section 5.7.82)* *Do you agree with the average mortality rates presented in Table 5.7.12? If the answer is no, please provide further detail on your preferred method for derivation of population level mortality rates.* *The Scoping Report states that the assessment will use generic mortality rates as per Horswill and Robinson (2015)14, this is consistent with our advice in Guidance note 11. We advise for GBBG that survival rates are taken as per herring gull, but with the addition that juvenile herring gull survival rate should be used for juvenile GBBG, and an ‘average’ survival for juvenile and adult herring gull for immature GBBG.”*	The Project has modelled PVA in accordance with the recommendations within NatureScot's Guidance Note 11 (NatureScot, 2023) as recommended.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
NatureScot	465	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"Displacement analysis* *Scoping questions (from Section 5.7.87) Do you agree on the use of the matrix approach only described above for assessment of disturbance and displacement?* *Do you agree with the list [of ornithological receptors] and corresponding displacement and mortality rates for assessment? If the answer is no, please provide your preferred displacement and mortality rates.* *Do you agree with kittiwake displacement analysis not being required based on the above information, if the answer is no, it would be useful to understand your justification and any preferred worst-case scenario displacement and mortality rates to be applied and the method to determine / estimate the risk.* *Do you agree with the proposed displacement rates in Table 5.7.13, if the answer is no, please provide the SNCB preferred displacement rates so these can be incorporated when undertaking displacement analysis, alongside the Applicant's preferred approach.* *Do you agree that in the case of this proposed OAA it is too distant from seabird colonies to enable a meaningful assessment of displacement through the use of SeabORD and as such would SNCBs recommend the use of the 'matrix approach' in its place (SNCBs, updated 2022).* *We advise the use of the displacement and mortality rates presented within the Joint Statutory Nature Conservation Bodies (SNCB's) Interim Displacement Advice Note. The Scoping Report states an intention to use the applicant's own proposed displacement and mortality rates as the primary basis for the assessment (Section 5.7.14). We advise that our review of the application will be based on the SNCB agreed displacement and mortality rates and that these should form the main basis of the assessment. Any other rates presented will not form the basis of NatureScot's assessment of the*	In relation to approach to assessing distributional response effects please refer to stakeholder ID 329. In relation to use of SeabORD please refer to stakeholder ID 962.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			application. *The Scoping Report also states that a disturbance and displacement assessment is not required for kittiwake, due to the vulnerability scores from Bradbury et al. (2014). We advise that an assessment for displacement should be undertaken for kittiwake and that impacts for both kittiwake and gannet for displacement and collision are considered as additive, as per our Guidance note 8. This is standard industry practice in Scotland and is a precautionary approach due to evidence that supports mixed responses from kittiwake to offshore wind farm developments (i.e. some birds are displaced and others are not and so are therefore at risk of collision).* *The Scoping Report states that the project does not intend to use SeabORD for the assessment of disturbance and displacement (Section 5.7.86). The justification for this is that the project area falls outside of the mean max foraging range for the majority of guillemot and razorbill colonies along the North East. We do not support this justification and advise that SeabORD be used to undertake an assessment of puffin, guillemot, razorbill and kittiwake. The matrix approach should be used to assess these species outside of the chick rearing period as per our Guidance note 8."*	
NatureScot	466	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"Collision risk modelling* *Scoping questions (from Section 5.7.98) Do you agree with the sCRM being run stochastically for informing collision risk estimates?* *Based on the first year of survey data do you agree with the proposed receptors (see Table 5.7.15) requiring collision risk modelling? If the answer is no, please provide further details of other species you feel should be included.* *Do you agree with the proposed input parameters for modelling in Table 5.7.15 below? If the answer is no, please provide reference and justification for your preferred rates.*	The Project has undertaken CRM in accordance with the latest recommendations within NatureScot's Guidance Note 7 (NatureScot, 2025b). With respect to great skua please refer to stakeholder ID 326.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			Do you agree will the proposed additional modelling for gannet in order to resolve the issue of overestimating combined displacement and collision risk predicted impacts? *Our advice on collision risk modelling is presented in Guidance note 7. The Scoping Report states the proposed approach is to use the stochastic collision risk model defined in McGregor et al. (2018), we confirm this is in line with our advice. More specifically we advise the use of the 2022 update to the sCRM tool shiny app (Caneco, 2022). This update should also be used to run deterministic output (with values specified to enable repeatability). We require that outputs for both stochastic and deterministic CRM are presented using this tool. In general we support the list of species included for collision risk assessment but advise year 2 DAS outputs will also influence this list. Based on numbers of great skua recorded in the first year surveys we advise that this species is taken forward for collision risk assessment.* *The Scoping Report states that for all species Band Option 2 will be applied using generic flight height distributions from Johnston et al. (2014). In addition and where applicable, Band Option 3 will be run for species with available avoidance rates (Section 5.7.89). As stated in the Scoping Report, there is an update to avoidance rates currently pending publication, we advise that these updated avoidance rates be used once the report is published.* *The Scoping Report states that: "As gannet has been scoped in for assessment of both displacement and collision risk, it is likely that there will be significant over estimation of predicted impacts on the species when the two impacts are combined, as a bird which is displaced would not be at risk of collision and vice versa. In order to resolve this issue, the Project suggests that additional modelling with reduced densities based on the suggested displacement rates in Table 5.7.15 be undertaken." (Section 5.7.97). We do not endorse adjustment of densities in*	

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			order to resolve over estimation of predicted impacts. There is work ongoing to look at how gannet behave with respect to macro and meso avoidance and means of quantifying this but this research is not currently published. Until such a point as the research is published we advise that collision and displacement are considered as additive for both gannet and kittiwake. We advise that flight type for gannet should be set as gliding, not flapping, as is presented in Table 5.7.15. *The Scoping Report states that flight height data derived from site-specific DAS surveys will be provided but anticipates that this will not be robust enough to include in the assessment of collision. As per our Guidance note 7, Johnston et al. (2014) currently remains the recommended reference for generic flight heights and is the default within the sCRM tool. We acknowledge uncertainty remains around best practice for flight height data collection methods, primarily due to absence of agreed validation of techniques. Further discussion and agreement on use of flight height data derived from the site-specific surveys is required for use in either Band Options 2 or 3.* *If site-specific flight height data are to be presented for context we expect a full description of method, accuracy, precision and comparison with Johnston et al. (2014), with explanation of any differences to inform discussions with NatureScot. We note that use of site-specific flight height for sCRM requires recalculations of avoidance rates. Our assessment will be based on the use of generic flight height data."*	
NatureScot	467	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"Population viability analysis (PVA)* *Scoping questions (Section 5.7.100)* *Do you agree with the use of the Seabird PVA tool (Searle et al. 2019) for informing population level effects?* *Do you agree with the proposed general threshold for further investigation of impacts through the use of PVA?*	As recommended by NatureScot, the Project has used a survival rate change 0.02% as the threshold for PVA requirement.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			We agree that the Natural England PVA Tool (Searle et al. 2019) should be used to undertake PVA. *No threshold is proposed in the Scoping Report, however our Guidance note 11 states that: "the impacts of collision and distributional responses, such as displacement, will need to be considered in the context of relevant SPA breeding colonies particularly where the assessed effects exceed a change to the adult annual survival rate of 0.02 percentage point change. For example, if a survival rate was estimated at 80% and this decreased to 79.98% when including the impacts of apportioned collision or distributional responses, a PVA should be undertaken."*	
NatureScot	468	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"Potential impacts* *We are broadly content that the standard pathways of collision, disturbance, displacement and barrier effects have been captured. However, Section 5.7.52 states that barrier effects are scoped out. We disagree that these should be scoped out of assessment. However, we accept that this impact pathway can be difficult to separate from displacement, and we agree that these can both be dealt with together in the assessment. As a general comment – we are moving towards terming these "distributional responses"."*	The Project had adopted the term 'distributional responses' as the effect pathway which is inclusive of consideration of displacement and barrier effects.
NatureScot	469	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"Potential impacts* *Barrier impacts to migrating birds should also be scoped in. Marine Scotland are undertaking an update to the Strategic assessment of collision risk of Scottish offshore windfarms to migrating birds. Marine Scotland are best placed to advise when this report will be published."*	As requested, the Project has assessed the potential for barrier effects to migrating birds as detailed within **Section 12.10.3**.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
NatureScot	470	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"Potential impacts* *We agree with the applicant's decision to scope out operational disturbance and displacement within the offshore export cable corridor."*	The Project welcomes this agreement.
NatureScot	471	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"We are broadly content with the proposed approach to cumulative assessment described in Sections 5.7.54-57. However, the Scoping Report states (Section 5.7.55) that cumulative impacts during construction and decommissioning stages are anticipated to be scoped out. We advise that this should be scoped in to assessment at this stage."*	The Project has further considered the potential for cumulative effects during the construction and decommissioning stages for the effect pathways identified within **Section 12.4.5**, the results of which are presented within **Volume 3, Appendix 33.4: Offshore and Intertidal Ornithology CEA**. Due to the temporary and localised nature of such works, combined with the Project's proposed mitigation, no potential for a significant cumulative effect to arise was identified for the construction and decommissioning stage.
NatureScot	472	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"Section 4.2.53 of the Scoping Report states the intention to use the Cumulative Effects Framework (CEF) when available, we support this intention. The CEF is expected in April 2023, so we anticipate it will be in place for use in the EIA Report and HRA for this project."*	The CEF tool at the time of drafting the Chapter is still unavailable. Please refer to stakeholder ID 870 in relation to the Project's proposed approach to cumulative assessment in the absence of the CEF.
NatureScot	473	12 May 2023	*"We note the proposed approach to Transboundary impacts set out in Section 5.7.59 and Appendix4A. We recommend*	Following completion of MarramWind HRA Screening, no LSE were

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		MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*further discussion on this topic with Marine Scotland and NatureScot following submission of the MarramWind HRA Screening Report and final Ornithology Baseline Report. It is likely that impacts will occur to seabird populations that breed outside Scotland."*	identified for designated sites outwith UK territorial waters. Therefore, the potential for a significant transboundary effect can confidently be ruled out.
Aberdeenshire Council	630	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"In terms of ecology, the proposed range of ecological surveys is considered to be comprehensive and covers the features that are potentially present within the study area. The project impacts for terrestrial ecology and ornithology that have been scoped into the EIA and the proposed approach to the assessments is acceptable."*	The Project welcomes this agreement.
RSPB	637	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"RSPB encourage the adoption of a precautionary approach to the identification of relevant protected sites for seabird with clear methodology on the exclusion of sites and species."*	Such evidence and methodology are provided within the **Report to Inform Appropriate Assessment (RIAA)**.
RSPB	638	12 May 2023 MD-LOT Scoping Opinion Appendix 1: Consultation Responses & Advice (Scottish Government, 2023).	*"We agree with the avoidance rates recommended by the Statutory Nature Conservation Bodies with the exception of breeding gannets where a 98% avoidance rate is more appropriate. This is because the figures used for the calculation of avoidance rates advocated by the SNCBs are largely derived from the non-breeding season for gannet (see Cook et al. 2014 and 2018) and there is evidence that the foraging movements and behaviours of gannets will vary in relation to stage of the breeding season (see Lane et al. 2010) and between the breeding and non-breeding season (see Cook et al. 2018)."*	The advice provided relating to this comment has been superseded by the recent updates within NatureScot's Guidance Note 7 (NatureScot, 2025b), which the Project has followed to inform collision risk assessments.

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RSPB	676	12 June 2023 RSPB Project Update Meeting.	*"RSPB are very interested to hear about any tagging work and would request further engagement."*	The Project has no plans to undertake tagging work for the Project.
RSPB	677	12 June 2023 RSPB Project Update Meeting.	*"The Project asked RSPB whether their opinion on preferred avoidance rates stated within their Scoping Opinion response had changed following the publication of Joint Nature Conservation Committee (JNCC) review of data used to calculate avoidance rates for collision risk modelling of seabird (Ozlanlav-Harris et al. 2023). RSPB replied that they were still reviewing the paper and had not heard anything yet with respect to their preferred parameters changing."*	In the absence of advice from RSPB, NatureScot's advice has superseded the query by the recent updates within NatureScot's Guidance Note 7 (NatureScot, 2025b), which the Project has followed to inform collision risk assessments.
RSPB	678	12 June 2023 RSPB Project Update Meeting.	*"The Project asked to be informed if RSPB's preferred avoidance rates change, particularly in relation to gannets. RSPB acknowledged that within RSPB's Scoping Opinion Response, they requested presentation of both the Counterfactual of Final Population Size (CFPS) and Counterfactual of Growth Rate (CGR) with respect to Population Viability Analysis (PVA). The project stated that the intention would be to present both metrics as requested. The Project asked if RSPB could advise on how they calculate thresholds of Adverse Effect on Integrity (AEoI) and account for uncertainty when interpreting CFPS in a density independent model, as the metric is time sensitive and can't be compared against known population trends, unlike the CGR.* *RSPB responded that the CPS is considered when the wind farm becomes operational and is preferred as it is more certain and more easily interpreted, Berwick Bank is a good example of this being used. A lot are identical even though numbers have been rounded up. Population size will be different."*	The Project notes the RSPB's preference to use the CFPS to inform assessment conclusion. However, the Applicant remains of the position that the CGR is the most appropriate metric for assessment conclusions as justified within **Volume 3, Appendix 12.4**.

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RSPB	679	12 June 2023 RSPB Project Update Meeting.	*“RSPB asked how density dependence will be incorporated into a colony and species specific model?* *RSPB prefer to draw conclusions from density dependence formulation given impacts of highly pathogenic avian influenza (HPAI). RSPB said there is value in the presentation of density formulation in modelling.”*	Due to the uncertainty regarding inclusion of density dependence within modelling, all PVA is based on a density independent approach.
RSPB	680	12 June 2023 RSPB Project Update Meeting.	*“RSPB states that the interpretation of the impact and setting thresholds for significance is difficult as we do not know what the population size will be in 30 years. It is difficult to achieve an accurate and evidence-based approach with that level of uncertainty. The higher the level of uncertainty, the more likely the RSPB would be object. RSPB explained that they do not work with formal thresholds, instead they are looking for populations to stabilise or increase.”*	This is noted regarding RSPB’s approach to assessment conclusions.
RSPB	682	12 June 2023 RSPB Project Update Meeting.	*“The Project stated that a full programme of 24 months of aerial surveys have now been completed for baseline characterisation. Some months were missed due to adverse weather conditions and limited survey window throughout the winter. This was mitigated by undertaking three surveys in February as agreed through consultation with MD-LOT and NatureScot.* *RSPB agree the survey method is acceptable if it was endorsed by MD-LOT and NatureScot. RSPB asked what the justification is for waiting a year for a missed survey?”*	The Project responded that a survey team would usually do two surveys in the same month the next year to account for a missed survey. However, given the geographical location of the Project it is challenging to have two suitable weather windows in the month during winter months. **Volume 3, Appendix 12.1**provides further detail on the DAS programme.
RSPB	683	12 June 2023 RSPB Project Update Meeting.	*“RSPB asked if bad weather is a threat to the structural integrity of the floating offshore windfarm.”*	The Project team confirmed that the wind farm will be specifically engineered to withstand harsh marine conditions. Design elements that help in that regards would include, but not be limited, to

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
				advanced mooring systems, dynamic positioning and redundant safety systems. There will be extensive simulation and testing before deployment and once operational the wind farm will be continuously monitored using sensors and remote systems to detect stress, fatigue and movement.
RSPB	685 and 686	12 June 2023 RSPB Project Update Meeting.	*"The Project raised avian flu and asked whether any 2023 colony survey data is available for any of the north east Scotland site which RSPB manage? And if so, can the Project utilise data on impact assessment. And, are there any publicly available avian flu reports published for sites which the RSPB manage? If not, when will these be available on the Seabird Monitoring Programme (SMP) website?* *RSPB responded that reports are written every year reporting monitoring results and will request if not published at the end of the breeding bird season."* *"RSPB stated that highly pathogenic avian influenza colony data is live and that the RSPB is very keen for it to be used to inform consenting decisions and assessment. RSPB to share data on this. RSPB are also formulating methodology in relation to avian flu."*	Data post HPAI is now available on the SMP database (SMP, 2025) and has been considered where appropriate within assessments. The Project thanks the RSPB for collating such information on HPAI and can confirm that the Tremlett *et al.* (2024) report has been used to provide reference to the effects of HPAI on key seabirds.
NatureScot and MD-LOT	696	16 February 2023, Project update meeting.	*"The Project said [DAS] surveys have been ongoing since September. MarramWind received scoping opinion from NatureScot saying they would like to see a 12 month continued data set used. The April survey was missed but two surveys in May have been undertaken to compensate. The data is being compiled but no major issues so far.*	The Project welcomes this agreement.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			NatureScot confirmed that the approach to undertaking two May surveys compensates for the missed April survey."	
NatureScot and MD-LOT	698	16 February 2023, Project update meeting.	*"The Project discussed the intertidal bird surveys to be completed March 2023. NatureScot highlighted the guidance for intertidal species survey is only 1 year (12 months) is sufficient. NatureScot asked to include gull and tern numbers in this data."*	The Project welcomes this agreement and can confirm counts of gulls and terns were collected during the surveys as presented within **Volume 3, Appendix 12.1**.
NatureScot and MD-LOT	959	16 February 2023, Project update meeting.	*"The Project discussed the current status of the DAS surveys. Due to weather conditions of the winter months there have been gaps, November 2021, February 2022, December 2022 and January 2023. Data gaps for November 2021 filled by conducting two surveys in November 2022 as discussed and agreed with MS-LOT and NatureScot. The Project proposed to do 3 surveys February 2023 to mitigate the February 2022 missed survey and December 2022, and 2 surveys in March to mitigate the January 2023 survey missed. The Project asked MS-LOT and NatureScot if they agree with the propose strategy to mitigate."*	Post Meeting, NatureScot responded via email confirming that the additional surveys assisted in filling data gaps to enable the species densities to be calculated as part of the baseline characterisation.
NatureScot	859	27 November 2024, Offshore Ornithology Assessment Methodology Clarifications Technical Note.	*"1. The Project would welcome agreement from NatureScot that assessments should be based on the breeding and non-breeding seasons as presented in Table 1. If NatureScot disagrees, then the Project would appreciate if the details of NatureScot's preferred approach to species-specific seasonal definitions could be provided.* *2. The Project would welcome agreement from NatureScot in relation to the proposed treatment of half months.* *NatureScot Response:* *The months presented in Table 1 align with our guidance as laid out in – Guidance Note 9 - Guidance to support Offshore*	The Project welcomes this agreement and can confirm these seasonal definitions have been used to inform impact assessments presented within this Chapter. With regard to half months the Project has generally followed the approach proposed with the exception of calculation of mean peak abundance for kittiwake and gannet. The justification for this deviation is provided within **Volume 3, Appendix 12.2**.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			Wind Applications: Seasonal periods for Birds in the Scottish Marine Environment so we are content with this approach."	
NatureScot	860	27 November 2024, Offshore Ornithology Assessment Methodology Clarifications Technical Note.	*"3. The Project would welcome agreement from NatureScot in relation to the proposed alternative approach to MRSea modelling and the species to be included.* *NatureScot Response* *We are happy with the proposed approach outlined by the Project for undertaking model-based and design-based abundance estimates. We would also note we are happy to discuss this further if any issues become apparent. It is also encouraging to see that the Project is considering the model fit so thoroughly and we welcome this approach.* *However, A minor point for 3.1.1.3, which we believe should read'...data gaps occur (i.e.no zero counts for a season) nor raw counts of less than 10 individuals in…' rather than '...data gaps occur (i.e. no zero counts for a season) or raw counts of less than 10 individuals in…'."*	Details on the approach to MRSea modelling for the Project are provided within **Volume 3, Appendix 12.5**. The Project can confirm the point raised by NatureScot is the correct interpretation of the method request we provided.
NatureScot	861	27 November 2024, Offshore Ornithology Assessment Methodology Clarifications Technical Note.	*"4. The Project would welcome agreement from NatureScot in relation to the proposed approach to account for availability bias for auk species.* *NatureScot Response* *We are currently considering the Dunn et al. (2024) paper and how we or if we will include this in an update to our guidance. However, if the Project would like to include these availability bias figures in the near future it would be useful to see a comparison of our current guidance and the new figures for a single species like guillemot. This would allow us to make a comparison before fully agreeing."*	Please see stakeholder ID 966 in relation to availability bias corrections factors used for the Project.
NatureScot	862	27 November 2024, Offshore Ornithology	*"5. For the key species specified in Table 1, please can NatureScot confirm whether the SMP database provides the*	Please see stakeholder response ID 961 in relation to most appropriate

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
		Assessment Methodology Clarifications Technical Note.	*most up to date colony counts for Scottish colonies? If not, is NatureScot able to provide the Applicant with information on how to obtain the most recent and up-to-date data on Scottish seabird colony counts.* *6. The Applicant would welcome feedback from NatureScot regarding its current position on colony census data from Scottish seabird colonies for use in the impact assessment. Are the 2024 census data considered to represent 'normal' counts, or are there instances of colonies being affected (reduced) by HPAI and/or unusual winter conditions? In such instances which colony counts do NatureScot consider most appropriate to use in the impact assessments, in particular for East Caithness cliffs SPA and Forth Islands SPA.* *NatureScot Response* *With regards to the first point, it is our understanding BTO are still finalising uploading some of the 2024 data on to the SMP. For gannets specifically, we undertook a gannet census this year, however, this data is not currently on the SMP but we can provide these counts if these are required before they are uploaded to the SMP.* *For the second point we think it is incorrect to consider the counts as normal or not normal. However, there is a valid point to consider about the temporal nature of the DAS baseline data being more comparable with the pre-HPAI population figures in terms of the context and level of impact for some species. Therefore, we advise to use the Seabirds Count populations but consider the context of the most recent counts as to whether the population is declining rather than the trends provided in Seabirds Count for most species. However, for gannet due to the timing of the DAS surveys, and when gannet were initially impacted by HPAI, the Project should compare this to more recent surveys, such as the census we undertook*	data to inform regional population sizes.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			this year. Alongside the fact that the Seabirds Count gannet data was from 2013."	
NatureScot	863	27 November 2024, Offshore Ornithology Assessment Methodology Clarifications Technical Note.	*"7. The Applicant would welcome agreement from NatureScot in relation to the proposed method for defining the regional breeding season populations. If NatureScot recommends an alternative approach, we would appreciate the relevant methodology being provided for review.* *NatureScot Response* *Yes, we are happy with the approach outlined.*	The Project welcomes this agreement. The approach to defining the breeding season populations for seabirds is provided in **Section 12.6**.
NatureScot	864	27 November 2024, Offshore Ornithology Assessment Methodology Clarifications Technical Note.	*8. The Applicant would welcome feedback from NatureScot in relation to the proposed method for defining the non-breeding season, the subsequent proposed non-breeding populations for all species in Table 4, and NatureScot's recommendation for the inclusion or exclusion of a non-breeding season assessment for Atlantic puffin.* *NatureScot Response* *Using the BDMPS to define non-breeding season population size is appropriate so we agree with the approach outlined by the Project. The approach outlined for guillemot follows our guidance, so we accept this approach as well.* *With regards to herring gull, a regional assessment in the non-breeding season is appropriate as mentioned in 5.1.1.3. Similar to guillemot we recommend that the herring gull non-breeding season population is defined using the breeding season foraging range. This is due to the fact that herring gulls do not migrate in the UK, as described in Furness (2015).If by using the breeding season foraging range to determine connectivity between the WDA and herring gull SPA colonies in both the breeding and non-breeding seasons results in no SPA connectivity with the WDA, herring gull should be*	The approach to defining the non-breeding season populations for seabirds follows the advice provided as summarised in **Section 12.6**. In relation to the NEEOG puffin literature review, the results of this piece of work are not yet available and therefore haven't been used for defining the non-breeding population size.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			assessed through the EIA only. *For puffin, we are aware of a North East and East Ornithology Group (NEEOG) meeting that took place recently where the assessment approach for Puffin in the non-breeding season was discussed. The developers at this meeting suggested a regional approach similar to guillemot could be looked at for puffin. We advised in this meeting that this seemed a sensible approach and an outcome of the meeting was that NEEOG would draft a paper of this proposal and send it to NatureScot for review. If this paper is available, we would be happy to review this and provide comment where necessary."*	
NatureScot	865	27 November 2024, Offshore Ornithology Assessment Methodology Clarifications Technical Note.	*"9. The Project would welcome agreement from NatureScot in relation to the proposed approach for assessment of distributional responses following the Guidance approach.* *10. The Applicant would welcome agreement from NatureScot in relation to the proposed method outlined above as being suitable for modelling.* *11. The Applicant would welcome confirmation from NatureScot regarding which version of the SeabORD tool should be used, Matlab or the R version for modelling.* *NatureScot Response* *With regards to the displacement section of the assessment our preference is that SeabORD is used where it is possible to do so. Therefore we would welcome discussions around preliminary SeabORD outputs to see how appropriate these are for informing the full assessment, we would be happy to have a meeting to discuss these outputs.* *With regards to undertaking two approaches to an assessment in this case, 'The Guidance approach' and 'The Developer approach' we would note that our guidance should be the*	See stakeholder ID 962 in relation to use of SeabORD for the Project. The Project can confirm that the terms 'The Guidance approach' and 'The Developer approach' have been used where the Project's critical appraisal of available evidence to inform assessment approaches has resulted in a different conclusion to recommendations within NatureScot's Guidance Notes (NatureScot, 2025b).

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			method used to come to the assessment conclusions for EIA and HRA, and the developer approach is presented elsewhere. Please look at the Berwick Bank application for an example of how to present two approaches to an assessment. *With regards to what version to use MatLab or R this is up to the applicant, we would ask that they just highlight which version they use."*	
NatureScot	866	27 November 2024, Offshore Ornithology Assessment Methodology Clarifications Technical Note.	*"12. The Applicant would welcome agreement from NatureScot in relation to the proposed collision risk input parameters for use in the sCRM presented in Table 7 for the Guidance approach. If these values do not align with NatureScot's recommended approach, the Applicant would appreciate the preferred collision risk input parameters and reference source to be provided.* *13. The Applicant would welcome feedback from NatureScot on how best to incorporate macro avoidance when assessing gannet within Scottish waters.* *14. The Applicant would welcome clarification from NatureScot on which of the following Johnston et al. (2014) generic flight height datasets it considers most appropriate for informing stochastic collision risk modelling:* *• The sCRM default dataset, which is specified as the Johnston et al. (2014) median and 95% intervals of bootstrap data;* *• The Johnston et al. (2014) maximum likelihood dataset, as previously recommended for deterministic modelling; or* *• The Johnston et al. (2014) maximum likelihood dataset and 95% intervals datasets, though the Applicant would require further discussion with NatureScot on how to appropriately incorporate these datasets within the model.* *15. The Applicant would welcome feedback from NatureScot*	The advice provided relating to this comment has been superseded by the recent updates within NatureScot's Guidance Note 7 (NatureScot, 2025b), which the Project has followed to inform collision risk assessments.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			on whether they are currently undertaking any work that may change the approach to CRM within the Project time frame for consent application and EIA submission in September 2025. *NatureScot Response* *The Project states in 6.3.1.1 that they used the figures presented in the Joint SNCB CRM guidance published recently, this is correct and aligns with the current approach we advise. We are currently in the process of updating out own CRM guidance note to align with this and this will be published before the new year.* *With regards to macro-avoidance for gannet, we are aware of and have reviewed the work undertaken by Natural England on this topic, however, we are not currently in a position to adopt the full recommendations of this work, we do however accept the output for gannet during the non-breeding season.* *With regards to flight height, the default dataset should be used, which is option 1 from the list provided by the Project.* *We are currently in the process of updating our CRM guidance to align with the Joint SNCB guidance note and provide clarity on other points around our approach for undertaking CRM. This guidance note update should be published on our website before the new year."*	
NatureScot	867	27 November 2024, Offshore Ornithology Assessment Methodology Clarifications Technical Note.	*"16. The Applicant would welcome agreement from NatureScot that there is not a requirement for distributional responses assessments during the construction / installation phase of the MarramWind Project as a floating offshore wind farm. If NatureScot disagree with this recommendation, then the Applicant would appreciate feedback on NatureScot's preferred approach for this part of the assessment.* *NatureScot Response* *We can agree to this approach, however, we would highlight that the key impact to consider during this period is an increase*	The Project welcomes this agreement and the effect pathways presented in **Section 12.9** have been updated accordingly. In relation to vessel disturbance please see response to stakeholder ID 967.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			in vessel movement associated with construction and the route vessels take so this should be considered in the assessment."	
NatureScot	870	27 November 2024, Offshore Ornithology Assessment Methodology Clarifications Technical Note.	*"20. The Applicant is aware that the East and Northeast regional groups have compiled ScotWind standardised cumulative tables of project impact values for inclusion within assessments (RoyalHaskoningDHV, 2024). The Applicant proposes to use such tables as a starting basis for cumulative assessments, though feedback would be welcomed on the cumulative tables compiled once NatureScot has reviewed these, particularly in relation to the following:* *• The project values presented for all consented projects appropriately define the level of potential impact for inclusion within assessments;* *• The proposed regional approach to assessment of herring gull cumulatively for the non-breeding season;* *• The use of as-built project designs to inform potential collision risk cumulative assessments;* *• The use of seasonal definitions within Furness (2015) for cumulative assessment* *• of kittiwake, razorbill and gannet, rather than the NatureScot (2020) seasonal definitions; and* *• The inclusion of English projects for assessment of cumulative distributional responses for kittiwake, given differences in assessment methodologies between offshore wind farms in English and Scottish waters.* *NatureScot Response* *We welcome the NEEOG approach and we are engaging with this and the development of this assessment. We will be happy to provide feedback to applicant when these outputs are available."*	The Project can confirm that the latest version of the NEEOG cumulative datasets has been utilised to inform cumulative assessments for offshore ornithology as presented within **Chapter 33: Cumulative Effects Assessment**.
NatureScot	871	27 November 2024, Offshore Ornithology	*"21. The Applicant would welcome agreement from NatureScot in relation to the proposed approach for consideration of HPAI*	The Project has utilised the information within Tremlett *et al.*

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
		Assessment Methodology Clarifications Technical Note.	*within assessments.* *NatureScot Response* *We advise that there is a need for ongoing engagement in relation to the impacts of HPAI and how to incorporate these impacts within the assessment. Work is continuing within NatureScot to provide further information and guidance, which will be available in due course. In the meantime, we expect the impact of HPAI on colonies to be considered qualitatively, particularly when reviewing PVA outputs.* *As the DAS work straddles the timing of the HPAI outbreak it will be important for assessment purposes to consider the current status of seabird populations at SPA colonies. Surveys have been undertaken at a number of key seabird colonies in 2023, co-ordinated by RSPB, some of which were repeated in 2024. Recent data for key species at some sites can be found on the SMP database. In addition, the RSPB have published a report (Tremlett et al. 2024) on HPAI effects, which will provide useful context."*	2024 to contextualise the potential effects on key seabird receptors as summarised within **Volume 3, Appendix 12.1**.
NatureScot	961	24 June 2025, HRA Meeting.	*"Contemporaneous counts – deriving counts from Seabirds Count and SMP database* *The Project requested clarification on the use of Seabird Count data (Burnell et al. 2023) or SMP data to inform EIA and HRA reference populations for assessment.* *NatureScot post meeting response* *To ensure that the assessment of predicted impacts at a population level are as robust and accurate as possible, we advise that the counts most contemporaneous with the Digital Aerial Survey (DAS) period are used. The DAS capture a snapshot of birds using or passing through the survey area at the time of each survey and across the 24-month survey period. The use of contemporaneous counts means that the birds recorded within the DAS period are attributed to their*	As noted by NatureScot the 4th national seabird census, Seabirds Count (Burnell *et al.* 2023) which is based on census data spanning 2015 – 2021 is contemporaneous with the DAS period. Therefore, where available these census data have been used to inform the regional breeding season population in **Section 12.6.2**. Where data is not available within the Burnell *et al.* (2023), the Project has selected the most contemporaneous data from the SMP (SMP, 2025) to inform the regional breeding season population.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			relevant colonies from the same year, therefore reducing the effects of interannual variation in population numbers (especially as a result of HPAI or other mass mortality events) and avoiding a mismatch of impacted birds vs breeding populations between years. Using population counts from the same or similar time period also improves compatibility and consistency, particularly at the stage of apportioning impacts to breeding populations. *Updated population counts for the majority of breeding colonies and species can be found in the 4th national seabird census, Seabirds Count (Burnell et al. 2023). This is the preferred source of seabird population counts for offshore wind applications, however given that the census did not cover all colonies, we are aware that there may be scenarios where some colonies do not have up to date counts for some species.* *If a population count for a specific colony in the Seabirds Count (Burnell et al. 2023) dataset is not contemporaneous with the DAS survey period for an offshore wind application, we advise that a relevant count should be obtained from the Seabird Monitoring Programme (SMP) database (SMP, 2025), if available. Counts should be derived from the SMP database with caution, with particular care taken to check the counting unit, method, and to ensure all relevant sub-sites within a master site are included in the total population count."*	
NatureScot	962	24 June 2025, HRA Meeting.	*"b. SeabORD methods and requirements:* *The Project proposed not to use the MATlab version of SeabORD but wait until the R coded version becomes available.* *NatureScot agreed with using the R version and if R version isn't ready, suggested to use the matrix approach."*	At the time of drafting this Chapter, the R version of SeabORD is still unavailable. Therefore, as agreed with NatureScot, only the matrix approach has been used to inform distributional response assessments.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
NatureScot	963	24 June 2025, HRA Meeting.	*"c. Feedback regarding the updated NEEOG cumulative assessment and approach to assessment:* *The Project proposed using the most recent numbers from the NEEOG cumulative and in combination spreadsheets from the first quarter of this year."*	As detailed further within **Volume 3: Appendix 33.4 Offshore and Intertidal Ornithology CEA,** the Project has used the NEEOG cumulative and in-combination impact values for other projects as a starting basis to inform cumulative and in-combination assessments. Where appropriate, these cumulative and in-combination values have been updated where projects have undergone further design refinement or new projects have emerged requiring inclusion. This may in part be due to the age of the NEOOG cumulative and in-combination assessments and the fact that it is a constantly evolving process, so the Project has utilised multiple other data sources to inform cumulative and in-combination assessments to ensure assessments are appropriate as possible.
NatureScot	964	24 June 2025, HRA Meeting.	*"d. PVA Modelling:* *The Project notes the ongoing difficulties in using the online tool and suggested using the offline R-scripted code.* *NatureScot agrees that NatureScot is comfortable with this approach, but requests that the annotated scripts are provided to ensure that the inputs used match the recommended inputs and those in the SHINY app, and to provide the log files or equivalent as a record of the parameters used.*	The Project can confirm that an offline version of the r-scripted code has been run. The Project is happy to supply this to NatureScot if required. The log files for all scenarios modelled are provided in **Volume 3, Appendix 12.4**.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			Regarding mandatory versus supplementary PVA requirements, the Project asked what scenarios are mandatory for NatureScot to conclude assessments. *NatureScot requested the lease period and 50 year scenarios are modelled.*	PVA has been modelled for both the expected operational timeframe (35 years) and 50 years as requested. Results for 50 years are provided in **Volume 3, Appendix 12.4**.
NatureScot	966	24 June 2025, HRA Meeting.	*f. Availability bias considerations:* *The Project asked if the Dunn et al. 2024 availability bias correction factors could be applied for the non-breeding season.* *NatureScot agreed to using the Dunn et al. 2024 data where available."*	Details of how the Dunn *et al.* (2024) availability bias corrections have been incorporated within abundance estimation is provided within **Volume 3, Appendix 12.1**.
NatureScot	967	24 June 2025, HRA Meeting.	*"g. Vessel disturbance assessment approach:* *Slides presented a flowchart of the Project's proposed approach to vessel disturbance assessments.* *NatureScot agreed that the flowchart captured their preferred approach to assessment.* *The Project flagged that consideration of vessel disturbance might not be feasible for Application due to discussion still ongoing on finalised ports and shipping routes for the project."*	Design refinements are still ongoing and the Project will engage further once refined post consent.
NatureScot	968	24 June 2025, HRA Meeting.	*"**Gannet breeding season connectivity*** *The Project explained that the Digital Aerial Survey data from August 2021 includes a significant bias on the density and abundance of gannets (and fulmar and great skua) recorded due to an attraction effect to a commercial fishing vessel within the survey area. This has resulted in a peak of bird counts (and therefore an inflated collision risk) that is above normal or expected levels. The Project proposed excluding August 2021 data due to the fishing vessel bias.*	The Project can confirm this approach has been implemented with commentary provided within **Volume 3, Appendix 12.3**. Due to the file size of the image containing the vessel, the full image could not be included within these documents, though a snip of the

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			NatureScot post meeting response *We agree that this data can be removed from the assessment as long as the evidence used to support this is provided for the audit trail; please provide copies of images from the DAS showing the boat activity during this survey. We would also ask that commentary on this is provided in the application so that it is clear why this data has not been used.* *As we are unclear of what the distribution of birds would have been without the vessel present, we advise the next-highest peak abundance value of each species seen outside of this month should be used as a replacement for the August 2021 survey data. We understand this is precautionary but consider it is the most appropriate solution. We are grateful for the opportunity to discuss this issue, but had we had earlier sight of this we would have indicated a potential need for additional DAS flights."*	image is provided in **Volume 3, Appendix 12.5.**
NatureScot	970	24 June 2025, HRA Meeting.	*"**Consideration of fulmar, shearwaters and petrels for Appropriate Assessment*** *The Project acknowledged the request made by NatureScot to further consider assessments for fulmar, shearwaters and petrels. The Project suggested undertaking a literature review with reference to tracking data to deliver a qualitative assessment.* *NatureScot agreed that the proposed approach is appropriate and asked the Project to refer to the ScotMer review and aerial survey data."*	Further consideration of potential effects on shearwaters and petrels is provided in **Section 12.6**, whilst an assessment of fulmar to distributional response effects is provided in **paragraph 12.10.1.2**.
NatureScot	971	24 June 2025, HRA Meeting.	*"**Migratory Collision Risk*** *The Project asked whether the Migratory Collision Risk Model (MCRM) tool was now officially available for use.*	Based on the update provided by NatureScot, the Project has undertaken mCRM as detailed within **Volume 3, Appendix 12.6**, and

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			NatureScot confirmed that the tool is now published and recommended for use in assessments. *NatureScot post meeting response* *NatureScot can confirm that the migratory collision risk modelling tool (mCRM) is now available and should be used as part of the Project assessment.* *Whilst the tool is now available, we are aware that there is an ongoing error where the default population estimates for some species do not match the values presented in the published work package 1 strategic study (Woodward et al. 2023). A bug report on the github page for the app suggests that this is likely due to the default values being taken from an earlier draft of the report. Marine Directorate have been made aware of the error and are working with the tool's developers to resolve this. We advise the applicant to check the populations in the sCRM tool against those in Woodward et al. (2023) and manually correct any errors if they have not been resolved at the time of use."*	subsequently assessed the potential impact on migratory species within **Section 12.10**.
NatureScot	972	24 June 2025, HRA Meeting.	*"**Thresholds for in-combination PVA*** *Within both Environmental Impact Assessments (EIA) and Habitat Regulations Appraisals (HRA), the predicted impacts of offshore wind developments need to be considered against relevant marine bird populations. The primary method used for assessing the population consequences in these assessments is population viability analysis (PVA).* *Our advice on the requirement for PVA is as follows:* *Project alone impacts* *• PVAs will be required for all sites and species where the project alone impacts equal or exceed a 0.02 percentage point change in combined breeding and non-breeding season adult survival rate (i.e. a ≥0.02 percentage point decrease in survival*	The Project can confirm that the advised threshold of 0.02 percentage point change in combined breeding and non-breeding season survival rate has been used to determine requirements for PVA. Details of the methodology followed for PVA modelled and subsequent outputs is provided in detail within **Volume 3, Appendix 12.4**. When concluding assessments involving PVA outputs, the Project can confirm that the recommended

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			rate or a ≥ 0.02 percentage point increase in mortality rate) *• This could apply to any level of project alone mortality, though in reality it is unlikely that a very low project alone mortality will meet this threshold. However, annual adult mortality and changes in adult survival rate values should be presented for all sites and species, thereby providing clarity on when PVA is required.* *In-combination impacts* *• PVAs will generally be required for all sites and species where the in-combination impacts equal or exceed a 0.02 percentage point change in combined breeding and non-breeding season adult survival rate. (i.e. a ≥0.02 percentage point decrease in survival rate or a ≥ 0.02 percentage point increase in mortality rate)* *• We no longer advise applying a threshold for the requirement of an in-combination PVA based on the project-alone mortality contribution (number of birds per annum). Due to Adverse Effect on Site Integrity being predicted at several SPAs (particularly on the east coast of Scotland), any project-alone mortality contribution which results in an in-combination impact equal to or exceeding a 0.02 percentage point change in annual adult survival rate will require a PVA. This applies to both EIA and RIAA assessments.* *Table 1: Scenarios for PVA thresholds* ***Project-alone percentage point decrease in annual adult survival rate*** | ***In-combination percentage point decrease in annual adult survival rate*** | ***Project-alone PVA required?*** | ***In-combination PVA required?***	factors provided have formed the basis of conclusion drawn.

Stakeholder	Stakeholder issue ID	Date, document, forum	Stakeholder comment	How is this addressed in the EIA Report
			<0.02 *<0.02* *No* *No* ***<0.02*** *≥0.02* *No* *Yes* ***≥0.02*** *≥0.02* *Yes* *Yes* *When interpreting the results of the PVA, it is important to look at counterfactuals even where there is only a small project contribution, as we consider this along with a number of other factors. These include:* *• Proposed development scale and location* *• Colony and species-specific contextual elements* *• Long term colony trends* *• Short-term colony trends* *• Species life history* *• Proportional importance of species in Scotland and UK* *• HPAI and mortality event impacts (e.g. wrecks)* *• Climate change sensitivity* *• Confidence in the environmental impact assessment undertaken.* *Due to the high number of offshore wind projects currently being developed there is potential for even very small additional mortality to be of concern for certain species at certain sites. For example, species with smaller populations such as great black-backed gull, are likely to be significantly impacted by a comparably smaller predicted impact.”*	

12.4 Scope of the assessment

12.4.1 Overview

12.4.1.1 This Section sets out the scope of the EIA for offshore and intertidal ornithology. This scope has been developed as the Project's design has evolved and responds to stakeholder feedback received to-date, as set out in **Section 12.3**.

12.4.2 Spatial scope and study area

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

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

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

12.4.3 Temporal scope

12.4.3.1 The temporal scope of the assessment of offshore and intertidal ornithology is the entire lifetime of the Project, which therefore covers the construction, O&M, and decommissioning stages. It is anticipated that the construction of the Project will commence in 2030, with the first phase becoming fully operational by 2037. It is anticipated that the second phase of the Project would become fully operational by 2040 and the third phase by 2043. The operational lifetime of the Project for each phase is expected to be 35 years.

12.4.4 Identified receptors

12.4.4.1 The spatial and temporal scope of the assessment enables the identification of receptors that may experience a change as a result of the Project. This includes offshore ornithology, with receptor species being primarily those that are referred to as ‘seabirds’ but can also include species that have seasonal associations with the offshore waters such as divers and migratory species. The identified receptors also include intertidal ornithology, with receptor species being primarily waterfowl, divers, seabirds and waders. This assessment also considers migratory bird species that may have a migratory flight path and / or breeding or wintering grounds in the vicinity of the Red Line Boundary.

12.4.4.2 The bird species identified as occurring within the Red Line Boundary (see **Section 12.6** for detail) and that therefore may be present during the lifetime of the Project are outlined in **Table 12.2**. The presence of a particular species does not inherently make it a receptor to an effect, however. An evaluation of receptors is presented in **Section 12.8.3**, which determines those species of relevance for assessment. Further detail on all species is provided in **Section 12.8.3** and in **Volume 1, Appendix 12.1**.

Table 12.2 Identified receptors requiring assessment for offshore and intertidal ornithology

Receptor	Receptors group		
	Intertidal	Offshore	Migratory
Canadian light-bellied brent goose (*Branta bernicla hrota*)			✓
Dark-bellied brent goose (*Branta bernicla bernicla*)			✓
Svalbard light-bellied brent goose (*Branta bernicla hrota*)			✓
Greenland barnacle goose (*Branta leucopsis*)			✓
Svalbard barnacle goose (*Branta leucopsis*)			✓
Icelandic greylag goose (*Anser anser*)			✓
Bean goose (*Anser fabalis)*			✓
Pink-footed goose (*Anser brachyrhynchus*)	✓		✓
European white-fronted goose (*Anser albifrons albifrons*)			✓
Greenland white-fronted goose (*Anser albifrons flavirostris*)			✓
Bewick's swan (*Cygnus columbianus bewickii*)			✓
Whooper swan (*Cygnus cygnus*)			✓
Shelduck (*Tadorna tadorna*)			✓
Gadwall (*Mareca strepera*)	✓		✓
Wigeon (*Mareca penelope*)	✓		✓
Mallard (*Anas platyrhynchos*)			✓
Pintail (*Anas acuta*)			✓

Receptor	Receptors group		
	Intertidal	Offshore	Migratory
Teal (*Anas crecca*)			✓
Pochard (*Aythya ferina*)			✓
Tufted duck (*Aythya fuligula*)			✓
Scaup (*Aythya marila*)			✓
Eider (*Somateria mollissima*)	✓		✓
Velvet scoter (*Melanitta fusca*)			✓
Common scoter (*Melanitta nigra*)	✓		✓
Long-tailed duck (*Clangula hyemalis*)	✓		✓
Goldeneye (*Bucephala clangula*)	✓		✓
Goosander (*Mergus merganser*)			✓
Red-breasted merganser (*Mergus serrator*)	✓		✓
Nightjar (*Caprimulgus europaeus*)			✓
Corncrake (*Crex crex*)			✓
Spotted crake (*Porzana porzana*)			✓
Great crested grebe (*Podiceps cristatus*)			✓
Slavonian grebe (*Podiceps auritus*)			✓
Stone curlew (*Burhinus oedicnemus*)			✓
Oystercatcher (*Haematopus ostralegus*)	✓		✓
Avocet (*Recurvirostra avosetta*)			✓
Grey plover (*Pluvialis squatarola*)	✓		✓
Golden plover (*Pluvialis apricaria*)	✓		✓
Dotterel (*Charadrius morinellus*)			✓

Receptor	**Receptors group**		
	Intertidal	**Offshore**	**Migratory**
Ringed plover (*Charadrius hiaticula*)	✓		✓
Lapwing (*Vanellus vanellus*)	✓		
Whimbrel (*Numenius phaeopus*)	✓		✓
Curlew (*Numenius arquata*)	✓		✓
Bar-tailed godwit (*Limosa lapponica*)	✓		✓
Black-tailed godwit (*Limosa limosa*)			✓
Woodcock (*Scolopax rusticola*)			✓
Snipe (*Gallinago gallinago*)			✓
Red-necked phalarope (*Phalaropus lobatus*)			✓
Wood sandpiper (*Tringa glareola*)			✓
Redshank (*Tringa totanus*)	✓		✓
Greenshank (*Tringa nebularia*)			✓
Turnstone (*Arenaria interpres*)	✓		✓
Knot (*Calidris canutus*)	✓		✓
Ruff (*Calidris pugnax*)			✓
Sanderling (*Calidris alba*)	✓		
Dunlin (*Calidris alpina*)	✓		✓
Purple sandpiper (*Calidris maritima*)	✓		✓
Arctic tern (*Sterna paradisaea*)		✓	
Common tern (*Sterna hirundo*)	✓		
Sandwich tern (*Thalasseus sandvicensis*)	✓		
Kittiwake (*Rissa tridactyla*)		✓	

Receptor	Receptors group		
	Intertidal	Offshore	Migratory
Black-headed gull (*Chroicocephalus ridibundus*)	✓		
Common gull (*Larus canus*)		✓	
Herring gull (*Larus argentatus*)		✓	
Great black-backed gull (*Larus marinus*)		✓	
Lesser black-backed gull (*Larus fuscus*)		✓	
Arctic skua (*Stercorarius parasiticus*)		✓	
Great skua (*Stercorarius skua*)		✓	
Puffin (*Fratercula arctica*)		✓	
Black guillemot (*Cepphus grylle*)		✓	
Razorbill (*Alca torda*)		✓	
Little auk (*Alle alle*)		✓	
Guillemot (*Uria aalge*)		✓	
Red-throated diver (*Gavia stellata*)		✓	✓
Black-throated diver (*Gavia arctica*)		✓	✓
Great northern diver (*Gavia immer*)		✓	
European storm petrel (*Hydrobates pelagicus*)		✓	
Fulmar (*Fulmarus glacialis*)		✓	
Manx shearwater (*Puffinus puffinus*)		✓	
Gannet (*Morus bassanus*)		✓	
Shag (*Gulosus aristotelis*)	✓		
Bittern (*Botaurus stellaris*)			✓
Little egret (*Egretta garzetta*)	✓		

Receptor	Receptors group		
	Intertidal	Offshore	Migratory
Osprey (*Pandion haliaetus*)			✓
Honey buzzard (*Pernis apivorus*)			✓
Marsh harrier (*Circus aeruginosus*)			✓
Hen harrier (*Circus cyaneus*)			✓
Montagu's harrier (*Circus pygargus*)			✓
White-tailed eagle (*Haliaeetus albicilla*)			✓
Short-eared owl (*Asio flammeus*)			✓
Merlin (Falco columbarius)			✓

12.4.5 Potential effects

12.4.5.1 Potential effects on offshore and intertidal ornithological receptors that have been scoped in for assessment are summarised in **Table 12.3** The effect pathways presented within **Table 12.3** have been discussed and agreed with relevant stakeholders as summarised within **Section 12.3**. No effect pathways were identified for assessment of intertidal ornithology during the O&M stage. This is because during O&M stage the export cable will be fully installed and subterranean, with only the potential for infrequent ad-hoc maintenance.

Table 12.3 Potential effects for offshore and intertidal ornithology

Potential effect	Receptor	Activity or impact	Potential effect
Construction stage			
Direct temporary habitat loss / disturbance (OAA and offshore export cable corridor)	Offshore ornithological receptors.	Construction activities such as increased vessel activity and above and underwater noise may result in temporary direct disturbance or displacement of birds.	Potential for temporary habitat loss of important feeding and roosting areas.
Direct temporary habitat loss / disturbance (export cable corridor landfall)	Intertidal ornithological receptors.	Construction activities such as increased vehicle activities, footfall, excavation and cable laying may result in temporary direct	Potential for temporary habitat loss of important feeding and roosting areas.

Potential effect	Receptor	Activity or impact	Potential effect
		disturbance / displacement of birds.	
Indirect impacts due to effects on prey species and habitats (OAA and offshore export cable corridor)	Offshore and intertidal ornithological receptors.	Impacts may result from underwater noise or the generation of suspended sediments that may alter the distribution, physiology or behaviour of bird prey species and thereby have an indirect effect.	These mechanisms could potentially alter the amount of prey available in the area of active construction works and surrounding area.
Operation and maintenance stage			
Distributional responses (OAA)	Offshore ornithological receptors.	The presence of WTGs has the potential to disturb and displace birds from within and around the Project area. Additionally, the presence of WTGs may lead to barrier effects for birds whilst undertaking migratory, foraging or commuting flights.	This may result in energetic consequences due to reduced areas available for foraging and loafing or additional energetics to fly around the OAA.
Collision risk (OAA)	Offshore ornithological receptors.	There is a risk of birds in flight colliding with rotating WTG blades.	As a worst-case, collision with infrastructure could result in consequent mortality of birds.
Entanglement with mooring lines (OAA)	Offshore ornithological receptors.	Derelict / lost fishing gear could entangle in mooring lines with the potential for diving seabirds to become entangled.	Birds entangled within derelict/lost fishing gear are expected to suffer consequent mortality.
Indirect impacts due to effects on prey species and habitats (OAA)	Offshore ornithological receptors.	Impacts may result from underwater noise or the generation of suspended sediments that may alter the distribution, physiology or behaviour of bird prey species and thereby have an indirect effect.	These mechanisms could potentially alter the amount of prey being available in the Project area and surrounding area. Although, there is evidence that fish and mobile invertebrates may be attracted to the operational area (Kerckhof *et al.* 2010; EMU Ltd., 2008; Krone *et al.* 2013; Linley *et al.* 2008 and Wilhelmsson *et al.* 2006) and so beneficial impacts may occur.

Potential effect	Receptor	Activity or impact	Potential effect
Decommissioning stage			
Direct temporary habitat loss / disturbance (OAA and offshore export cable corridor)	Offshore ornithological receptors.	Decommissioning activities such as increased vessel activity and above and underwater noise may result in temporary direct disturbance or displacement of birds.	Potential for temporary habitat loss of important feeding and roosting areas.
Direct temporary habitat loss / disturbance (offshore export cable corridor landfall)	Intertidal ornithological receptors.	Decommissioning activities such as increased vehicle activities, footfall, excavation and cable laying may result in temporary direct disturbance / displacement of birds.	Potential for temporary habitat loss of important feeding and roosting areas.

12.4.6 Effects scoped out of assessment

12.4.6.1 A number of potential effects have been scoped out from further assessment, resulting from a conclusion of no likely significant effect. These conclusions have been made based on the knowledge of the baseline environment, the nature of planned works and professional judgement on the potential for impact from such projects more widely. The conclusions follow (in a site-based context) existing best practice, with activities or impacts to be scoped out considered in turn in **Table 12.4,** following agreement with stakeholders during Scoping Opinion (see **Table 12.1**).

Table 12.4 Activities or effects scoped out of assessment

Activity or impact	Rationale for scoping out
Accidental pollution during construction and decommissioning (including indirect effects) affecting offshore and intertidal ornithological receptors.	It is expected that potential impacts would be of local spatial extent, short term duration, and therefore of negligible potential direct and indirect impacts, which is not significant in EIA terms. This has been the case for other offshore wind farms and is considered to be equally applicable to the Project, for which construction will be comparable in scale to operation and within the same environment, whilst implementing an appropriate approach to construction practices. Additionally, the likelihood of this impact occurring is very low, and embedded mitigation in the form of a Marine Pollution Contingency Plan (MPCP) (see **Table 12.12**) will be in place to safeguard the marine environment in the unlikely event a pollution event does occur. Therefore, this impact is scoped out of further consideration.
Operational disturbance and displacement (offshore export cable corridor) affecting offshore and intertidal ornithological receptors.	Given that potential impacts along the offshore export cable corridor would be highly localised and episodic (for instance, limited to any maintenance or repair of the export cables), impacts would be negligible so this impact is scoped out from further consideration.

12.5 Methodology for baseline data gathering

12.5.1 Overview

12.5.1.1 Baseline data collection has been undertaken to obtain information over the study area described in **Section 12.4**. The current and future baseline conditions are presented in **Section 12.6**.

12.5.2 Desk study

12.5.2.1 The data sources that have been collected and used to inform this offshore and intertidal ornithology assessment are summarised in **Table 12.5**.

Table 12.5 Data sources used to inform the offshore and intertidal ornithology chapter

Source	Summary
Bird records from the North East Scotland Biodiversity Record Centre (NESBReC) and the North East Scotland Scottish Ornithologists' Club (SOC) Bird Recorder, BTO Wetland Bird Survey (WeBS) Data, as well as any other relevant bodies identified	Intertidal and nearshore bird records to inform on abundance and distribution of species within the intertidal zone of influence (ZoI).
The BTO Bird Atlas (Balmer *et al.,* 2013), Birds of Scotland (Forrester *et al.,* 2007), the Aberdeenshire County Bird Report (Scottish Ornithologists Club, multiple years), The Breeding Birds of North-East Scotland (Francis *et al.,* 2011), and any other relevant publications identified	Intertidal and nearshore bird records and ecology to inform on abundance and distribution of species within the intertidal ZoI.
Wade *et al.* 2016; Furness *et al.,* 2013; Furness *et al.,* 2012; Langston, 2010; Stienen *et al.,* 2007; Drewitt and Langston, 2006; Garthe and Hüppop, 2004	Guidance and research – sensitivity of birds to offshore wind farms.
Buckingham *et al.,* 2022; NatureScot, 2023f; SNCBs, 2017, updated 2022; Dierschke *et al.,* 2016; Masden *et al.,* 2012, 2010; Speakman *et al.,* 2009	Guidance, research and methodology – offshore wind farm displacement / barrier effects on birds.
SNCBs, 2024; Woodward *et al.,* 2023; NatureScot, 2025b; Bowgen and Cook, 2018; McGregor *et al.,* 2018; Skov *et al.,* 2018; Cook *et al.,* 2014; Johnston *et al.,* 2014a and b; Band, 2012; Wright *et al.,* 2012; Cook *et al.,* 2012	Guidance, research and methodology – collision risk modelling, flight heights and avoidance rates for birds and offshore wind farms, including the Band deterministic model, the stochastic model and the migratory species model.
NatureScot, 2023g	Population viability analysis modelling tool for seabirds.
Cleasby *et al.,* 2020, 2018; Waggitt *et al.,* 2020; Woodward *et al.,* 2019; Wakefield *et al.,* 2017, 2013; Kober *et al.,* 2010; Stone *et al.,* 1995	Seabird foraging ranges and distribution at sea.
NatureScot, 2023d; NatureScot, 2020; Furness, 2015; Mitchell *et al.,* 2004; JNCC seabird	Bird population estimates.

Source	Summary
monitoring programme database; designated site citations / departmental briefs / conservation advice from the websites of SNCBs	
Relevant documents from marine licence applications for other offshore wind farms in UK offshore waters (in particular Scottish and English East Coast Waters), and Transboundary offshore wind farms	Information and data for cumulative (and in combination (HRA)) assessment.
Relevant ecological studies for species included in EIA (peer reviewed scientific papers and 'grey' literature), including postconstruction monitoring studies (for example, Moray Firth Regional Advisory Group https://marine.gov.scot/ml/moray-firthregional-advisory-group-mfrag), Kincardine Offshore Wind Farm bird collision study (KOWL, 2019), Offshore Renewables Joint Industry Programme (ORJIP) collision avoidance study (Skov *et al.,* 2018)	Other empirical evidence and studies relevant to assessment.

12.5.3 Site surveys

12.5.3.1 The site surveys that have been conducted and used to inform this offshore and intertidal ornithology assessment are summarised in **Table 12.6** For intertidal ornithology, site surveys comprised site-specific vantage point (VP) surveys targeting waterbirds, gulls, terns and seabirds at the proposed landfall sites. For offshore ornithology, DAS data was collected across 24 months, recording all ornithological receptors in the OAA and surrounding 4km buffer. For full details on survey methodologies, see **Volume 3, Appendix 12.1**.

Table 12.6 Site surveys undertaken

Survey type	Scope of survey	Coverage of study area
Vantage Point Surveys (September 2022 to August 2023)	A programme of 12 monthly VP surveys undertaken by APEM and conducted between September 2022 and August 2023 across the proposed landfall sites.	Full coverage (of the export cable corridor and landfall sites plus 500m buffer).
Digital Aerial Survey Data (April 2021 to March 2023)	A programme of 24 monthly DAS surveys undertaken by APEM and conducted between April 2021 and March 2023 across the OAA and 4km buffer.	Full coverage (OAA plus 4km buffer).

12.5.4 Data limitations

12.5.4.1 For intertidal ornithology, the primary data source is site-specific VP surveys, conducted over a 12-month period. Given the dynamic nature of the marine environment, bird distributions are expected to vary both spatially and temporally. Consequently, individual monthly surveys may not fully capture typical bird presence across the entire month. The same is also true for DAS data collected for offshore ornithological receptors. Despite this, both VP and DAS survey methodologies are in line with industry standard, with methodologies agreed with NatureScot during consultation (**Table 12.1**). As such, the survey data provides an appropriate indication of receptor presence, distribution and abundance for the purposes of this assessment.

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

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

12.6 Baseline conditions

12.6.1.1 The current baseline conditions have been determined based on sources identified in **Section 12.5**. For both offshore and intertidal receptors, this is predominantly drawn from site-specific surveys undertaken which are summarised below and discussed in detail in **Volume 3, Appendix 12.1**.

12.6.2 Offshore ornithology current baseline

Option Agreement Area

12.6.2.1 Current baseline conditions have been determined from 24 months of DAS data collection across the OAA plus 4km buffer, representing the relevant study area for offshore ornithological receptors as outlined in **Section 12.4.2**, noting that potential impacts on receptors within the export cable corridor and intertidal areas were scoped out (**Table 12.4**). Across the 24 months of DAS, 20 species were recorded with an overview of occurrence provided in **Table 12.7** below. Of these, guillemot, fulmar, gannet, kittiwake and razorbill were the most frequently encountered species, accounting for 95.4% of all birds recorded (guillemot (53.0%), fulmar (29.1%), gannet (6.5%), kittiwake (4.1%), razorbill (2.8%)).

Table 12.7 Overview of offshore ornithological receptors recorded in the Project OAA plus 4km buffer

Species	Frequency of occurrence over 24 surveys	Maximum predicted abundance estimate (and associated 95% CI) in the OAA plus 4km buffer
Guillemot	24	24,448 (22,158 to 26,964)
Fulmar	24	3,765* (1,328 to 7,353)
Gannet	24	2,814* (985 to 6,136)
Kittiwake	24	1,818 (1,261 to 2,473)
Razorbill	21	2,412 (1,973 to 2,863)
Puffin	16	1,064 (826 to 1,321)
Great black-backed gull	16	691 (131 to 1,669)
Herring gull	11	315 (107 to 598)
Great skua	4	54* (41 to 277)
Arctic tern	4	124 (54 to 201)
European storm petrel	2	298 (116 to 573)
Manx shearwater	2	17 (2 to 64)
Arctic skua	2	8 (1 to 23)
Lesser black-backed gull	2	8 (1 to 32)
Ruff	1	80 (10 to 241)
Common gull	1	23 (3 to 54)
Little auk	1	25 (3 to 58)
Woodcock	1	16 (2 to 40)
Red-throated diver	1	8 (1 to 24)
Whimbrel	1	8 (1 to 32)

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

Consideration of shearwaters and petrels

12.6.2.2 The species outlined in **Table 12.7** are considered a representative view of the current baseline in the OAA plus 4km buffer. It is acknowledged that surveys were only conducted during daylight hours, and NatureScot has raised concerns about the potential for missing nocturnally active species, notably Manx shearwater and European storm petrel (**Table 12.1**). However, based on available evidence, there is not expected to be any notable increase in numbers at night compared to those recorded during DAS.

12.6.2.3 The closest European storm petrel colonies to the OAA are located in the Shetland Isles. Tracking data indicate that individuals from these colonies forage up to 397km from the colony during daylight hours. In contrast, nocturnal distributions are considerably more restricted, with birds remaining closer to the colony. This behaviour reflects a diurnal foraging strategy followed by afternoon commuting flights to ensure arrival at the colony under cover of darkness (Bolton, 2021). Given that the OAA is located over 150km from Shetland, storm petrel presence in the area is expected to occur primarily during daylight hours. Consequently, DAS data are considered representative of storm petrel activity in the OAA, especially given data was collected at a resolution of 1.5cm Ground Sampling Distance (GSD) which is above global best practice. Over 24 months of DAS monitoring, storm petrels were recorded in only two months and in low numbers, indicating limited use of the site. No substantial nocturnal presence is anticipated beyond what has been captured during daylight surveys.

12.6.2.4 Similarly, Manx shearwater were recorded in low numbers (only in two months) during DAS, and surveys are not considered to underestimate presence due to potential nocturnal activity. Though Manx shearwater show some nocturnal activity, available evidence shows peak flight and foraging activity just after sunrise, with a second peak before sunset followed by a rapid decline at the onset of darkness (Dean *et al*., 2013). Manx shearwater foraging occurs almost exclusively during daylight hours, with bird activity in the early evening characterised by birds roosting on the water near to colonies before returning to burrows in darkness (Deakin *et al.,* 2022). Given the nearest SPA for Manx shearwater is >300km away on the west coast of Scotland, it is highly unlikely that Manx shearwater will be present within any proximity to the OAA during nocturnal hours, and therefore no substantial nocturnal presence is anticipated beyond what has been captured during daylight surveys.

12.6.2.5 It is recognised that both petrels and shearwaters are sensitive to light attraction, raising the theoretical possibility that artificial lighting associated with the Project could influence their behaviour. However, Deakin *et al*. (2022) indicates that disorientation in these species is primarily associated with high-intensity lighting, particularly under foggy conditions. The lighting used on offshore wind farms, including the Project, is of significantly lower intensity than that examined in such studies (focussing on more intense sources of light such as towns and oil rigs). There is currently no evidence to suggest that petrels or shearwaters are attracted to, or adversely affected by, the lighting levels typically used on offshore wind farms. Furthermore, given the low recorded presence of these species in the OAA plus 4km buffer, and the absence of any mechanism by which lighting would draw individuals in from more distant areas, the DAS data is concluded as appropriate at characterising the baseline abundance and distribution of such species within the study area.

12.6.2.6 In addition to species recorded during DAS data collection, migratory birds may also pass through the OAA during seasonal movements. Because DAS data provides only a snapshot in time, it may not fully capture these transient species. To address this, migratory species are considered further in **Volume 3, Appendix 12.6** and subsequently assessed in **Section 12.10.4**, using available information on flight paths and connectivity, particularly insights from Woodward *et al*. (2023).

Seasonal definitions

12.6.2.7 Of the recorded seabirds in **Table 12.7**, eight are scoped in for assessment of potential impacts in the offshore environment owing to their presence in DAS data and/or their potential sensitivity to offshore wind farm impacts as detailed in **Section 12.8.3**. For these species, quantitatively assessed impacts are considered seasonally and are assessed against species-specific regional populations. Seasonal definitions used for these receptors are presented in **Table 12.8** and are based on NatureScot (2020) guidance.

12.6.2.8 For instances where seasons extend only halfway through a given month, these are treated differently. Distributional response data collected from surveys up to the 15th of the month would be classified as early to mid-month, and data after the 15th would be classified as late-month. For assessing collision risk in half months, the predicted impact would be halved and apportioned equally to each half month to avoid double counting of impacts.

Table 12.8 Seasonal definitions for offshore ornithological receptors as defined by NatureScot (2020)

Species	Breeding season	Non-breeding season
Kittiwake	Mid-April to August.	September to mid-April.
Great black-backed gull	April to August.	September to March.
Herring gull	April to August.	September to March.
Guillemot	April to mid-August.	Mid-August to March.
Razorbill	April to mid-August.	Mid-August to March.
Puffin	April to mid-August.	Mid-August to March.
Fulmar	April to mid-September.	Mid-September to March.
Gannet	Mid-March to September.	October to mid-March.

Regional populations

12.6.2.9 An overview of regional populations for receptors considered within quantitative assessments is provided below, with resulting populations presented in **Table 12.9**.

12.6.2.10 Breeding season regional populations were calculated for the Project based on the total population of breeding adults from colonies within the mean maximum foraging range (MMFR) plus one standard deviation (SD) as defined in Woodward *et al.* (2019), with the following exemptions:

- For guillemot and razorbill, the MMFR plus one SD of 95.2km and 122.2km, respectively excluding Fair Isle data was used for sites south of the Pentland Firth, as per NatureScot Guidance Note 3 (2023b).
- For guillemot and razorbill, the MMFR plus one SD of 153.7km and 164.6km, respectively including Fair Isle data was used for sites north of the Pentland Firth, as per NatureScot Guidance Note 3 (2023b).
- Colony specific MMFRs were applied for the gannet feature of Forth Islands SPA, as per NatureScot Guidance Note 3 (2023b).

- Sites that are outwith the MMFR plus one SD range but are known to have tracking data overlapping with the Project site were included.

12.6.2.11 The number of breeding adults for colonies within the MMFR plus one SD were derived primarily from Burnell *et al.* (2023) and supplemented by the most contemporary colony counts from the Seabird Monitoring Programme (SMP, 2025) database for colonies which are not included within Burnell *et al.* (2023). Detailed breakdown of individual colonies within MMFR of the Project for key receptors is provided within Offshore Ornithology HRA Apportionment Report as Appendix A to the **Report to Inform Appropriate Assessment (RIAA)**.

12.6.2.12 During the breeding season, there is also a proportion of Scottish, UK, and overseas non-breeding individuals that have theoretical connectivity with the Project. The non-breeding component of the breeding season regional population was derived using the estimated proportion of immature birds per breeding adult in a typical population of each species based on the information contained within Furness (2015). Therefore, the total regional population within the breeding season is the sum of breeding adults from colonies within foraging range plus a non-breeding component based on the estimated number of immatures per breeding adult. The exception to this is puffin, where based on expert judgment it is considered that immature birds would remain on the wintering grounds year-round, which are outwith of the Project OAA. Therefore, the puffin breeding season regional population is calculated only as the number of breeding adults from colonies within MMFR plus one SD.

12.6.2.13 For herring gull and great black-backed gull, which have no breeding colonies within MMFR plus one SD of the Project, the total regional population within the breeding season was derived from the total number of immatures for the North Sea (or North Sea and English Channel, where appropriate), referenced from Appendix A of Furness (2015).

12.6.2.14 During the non-breeding season, where significant mixing of birds from different UK and overseas colonies occur, regional non-breeding populations were derived from the largest non-breeding population size for the North Sea (or North Sea and English Channel, where appropriate) as defined in Furness (2015). The exception to this approach is guillemot, as recent studies have shown that most remain in the broad vicinity of their breeding colonies during the non-breeding season (Buckingham *et al.* 2022). For these species, the non-breeding season population is considered to be the same as the breeding season population.

12.6.2.15 A regional approach was also undertaken to calculate the non-breeding population for herring gull as recommended in NatureScot’s responses to the MarramWind Offshore Ornithology Assessment Methodology Clarifications Technical Note. However, as no herring gull colonies are within MMFR plus one SD of the Project, the non-breeding population for herring gull was derived from the total number of immatures for the North Sea and English Channel plus the total number of overseas adults for the North Sea and English Channel, referenced from Appendix A of Furness (2015).

Table 12.9 Regional populations for offshore ornithological receptors

Species	Breeding population at colonies within mean-max plus one SD foraging range*	Estimated immatures per breeding adult in population (Furness, 2015)	Juvenile, immature and non-breeding individuals	Breeding Season (all individuals)	Non-breeding season (all individuals)
Kittiwake	216,500	0.31	66,812	283,312	829,937
Great black-backed gull	-	-	-	59,329**	91,399
Herring gull	-	-	-	256,222**	307,422
Lesser black-backed gull	-	-	-	-	209,007***
Guillemot	135,903	0.39	53,478	189,381	176,471
Razorbill	21,846	0.41	9,049	30,895	591,874
Puffin	234,412	0.06	13,901	248,313	231,957
Gannet	307,130	0.32	97,176	404,306	456,298

Table note: *Breeding colony counts taken from Burnell *et al.* (2023) and SMP database (SMP, 2025) where necessary. See Offshore Ornithology HRA Apportionment Report as Appendix A to the **RIAA** for further details.
**no breeding colonies within mean-max plus one SD foraging range, so breeding season population was derived from the total number of immatures for the North Sea (or North Sea and English Channel, where appropriate) (Furness, 2015).
*** no lesser black-backed gull were recorded during the breeding season so only a non-breeding regional population has been calculated for this species.

Offshore export cable corridor (up to MHWS)

12.6.2.16 Due to the offshore export cable corridor not intersecting areas of known significant concentrations of sensitive seabirds, such as common scoter or red-throated diver, or important bird areas such as SPAs, specific baseline data for this area were not collected and are, therefore, not included. Any potential impacts occurring within the offshore export cable corridor are expected to be spatially and temporally restricted and therefore it is not considered in detail. However, consideration is provided for nearshore waters in **Section 12.6.3**, where data were collected to inform the potential impacts from landfall activities.

12.6.3 Intertidal ornithology current baseline

Landfall(s) sites (from MLWS up to MHWS)

12.6.3.1 During VP surveys of the two proposed landfall sites, 42 species were recorded. These species were distributed widely across the survey area, although overall use of the intertidal area was limited at both Scotstown and Lundeton, with the exception of discrete roosting and loafing areas on intertidal rocks, located at the southern edge Scotstown and both the northern and southern areas of Lunderton. These were typically used by waders, gulls and shag.

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

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

12.6.3.4 An overview of species recorded and the temporal range of records across both landfall sites is presented in **Table 12.10**. Species recorded in important numbers (>1% of an SPA, Ramsar or SSSI population that may have connectivity with the proposed landfall sites and associated buffers, or >1% of the UK or international population) are highlighted **bold**.

Table 12.10 Overview of intertidal ornithological receptors recorded during site-specific vantage point surveys at the two proposed landfall sites

Species group	Species	Scotstown survey peak count	Lunderton survey peak count	Temporal range of records across both landfall sites
Waterfowl	Pink-footed goose	1	2	September to October
	Gadwall	30	0	September
	Wigeon	320	4	September to November
	Eider	**120**	**100**	Present year-round
	Common scoter	0	700	May
	Long-tailed duck	30	4	October to March
	Goldeneye	0	3	February to March
	Red-breasted merganser	3	23	March to June
Waders	Oystercatcher	20	20	Present year-round
	Lapwing	190	0	November to February
	Golden plover	260	0	October to February
	Grey plover	0	1	September

Species group	Species	Scotstown survey peak count	Lunderton survey peak count	Temporal range of records across both landfall sites
	Ringed Plover	65	30	January to May and also in recorded in August.
	Whimbrel	15	0	August to September.
	Curlew	20	5	Present year-round.
	Bar-tailed godwit	1	0	October
	Turnstone	20	13	Recorded in all survey months.
	Knot	24	1	August
	Sanderling	38	16	August to December and also recorded in May.
	Dunlin	6	13	July to March and also recorded in May.
	Purple sandpiper	9	25	October to May.
	Redshank	35	36	July to May.
All other target species	Kittiwake	110	45	May to November.
	Black-headed gull	159	150	Present year-round.
	Common gull	427	98	March to December.
	Great black-backed gull	25	18	Present year-round.
	Herring gull	**260**	83	Present year-round.
	Lesser black-backed gull	2	3	July to September and also recorded in May.
	Sandwich tern	**70**	**45**	May to August
	Arctic tern	265	0	May to August.
	'Commic' tern	0	110	May

Species group	Species	Scotstown survey peak count	Lunderton survey peak count	Temporal range of records across both landfall sites
	(Unidentified Arctic tern / common tern			
	Arctic skua	1	1	May, July and October.
	Common guillemot	**230**	162	Present year-round
	Razorbill	350	150	Present year-round
	Black guillemot	0	1	August
	Puffin	2	1	February, March, August and October.
	Red-throated diver	17	5	October to early May and also recorded in June.
	Black-throated diver	2	0	September
	Great northern diver	1	1	October
	Gannet	300	10	May to November.
	Shag	**820**	**295**	Present year-round
	Little egret	0	2	October

12.6.3.5 Species recorded in the intertidal area in significant numbers during VP surveys (**Table 12.10**) will be considered further for qualitative assessment only. See **Section 12.8.3** for intertidal species identified for assessment.

12.6.4 Future baseline

12.6.4.1 The current baseline description above provides an accurate reflection of the current state of the baseline environment. The earliest possible date for the start of the offshore construction of the Project is no earlier than 2030 with an expected operational life of 35 years per phase, and therefore there exists the potential for the baseline to evolve between the time of assessment and point of impact. Outside of short-term or seasonal fluctuations, changes to the baseline in relation to offshore and intertidal ornithology usually occur over an extended period of time. Based on current information regarding reasonably foreseeable events over the next three years, the baseline is not anticipated to have fundamentally changed from its current state at the point in time when impacts occur.

12.6.4.2 The baseline environment for operational / decommissioning effects is expected to evolve on a species-by-species basis. The future baseline is uncertain, however, should the Project be developed or not, the likely evolution of key populations will follow the general Scottish North Sea and wider biogeographic trends. Key drivers of potential change include climate change, prey availability, invasive species, disease and pollution (Dias *et al.,* 2019; Burnell *et al.,* 2023), though such effects from these population drivers are too uncertain to reliably include within assessment.

12.6.4.3 Climate change is a major driver of seabird population trends and distributions, with sea surface temperatures in Scottish waters projected to rise by approximately 0.06°C per decade (Dias *et al.,* 2019; Mitchell *et al.,* 2020; Hughes *et al.,* 2018). This warming disrupts prey availability, particularly during the breeding season when energy demands are highest, and seabirds show limited flexibility in adjusting breeding timing to match shifts in prey phenology, resulting in mismatches between chick-rearing periods and peak prey abundance (Keogan *et al.,* 2018; Régnier *et al.,* 2024). In eastern Scotland, survival of overwintering kittiwake has declined following warmer winters, with reduced breeding success the following year likely linked to lower sandeel availability and quality (Carroll *et al.,* 2017). On the Isle of May National Nature Reserve (NNR), sandeel energy content is estimated to have declined by up to 70% between 1973 and 2015, and increased presence of herring and sprat in the diets of kittiwake, razorbill, and guillemot over the past 25 years may reflect a shift toward alternative prey sources (Wanless *et al.,* 2018; Daunt and Mitchell, 2013).

12.6.4.4 While the recent ban on sandeel fishing in the North Sea is intended to support seabird recovery, its effectiveness may be constrained if climate-driven changes continue to impact sandeel life cycles (Daunt *et al.,* 2008). Extreme weather events are also increasing in frequency and severity, contributing to reduced breeding success and higher mortality rates. Mass-mortality events, often referred to as “winter wrecks”, are linked to intense storms and cyclones in the North Atlantic and are expected to become more common under future climate scenarios (Clairbaux *et al.,* 2021).

12.6.4.5 It is important to note that the Project, alongside other renewable energy projects, contributes to climate mitigation by reducing reliance on fossil fuels. While potential risks to seabirds from offshore renewables, such as collision risk and distributional responses, are acknowledged, these are considered relatively minor compared to the broader threat posed by climate change.

12.6.4.6 Fishing activity continues to influence prey availability. Scavenging species such as herring gull and fulmar previously benefited from fisheries discards, but policy changes, including the Common Fisheries Policy Landings Obligation (2015–2019), the 2015 EU discard ban, and the UK Fisheries Act 2020, have reduced this food source (Sherley *et al.,* 2020). The closure of sandeel fisheries in Scottish waters and the English North Sea is expected to benefit kittiwake and auk species, though this depends on the continued availability of sandeels as viable prey.

12.6.4.7 In recent years, HPAI has emerged as a significant threat to seabird populations. Some species, including gannet and kittiwake, have experienced declines exceeding 10% compared to pre-HPAI levels (Tremlett *et al.,* 2024). While a report by the RSPB has reviewed the impacts of the 2021–2022 outbreak (Tremlett *et al.,* 2024), the effects of the 2023 outbreak remain uncertain. Ongoing monitoring is essential, as the virus continues to evolve. For further information on HPAI impacts relevant to offshore ornithological receptors recorded in the OAA, see **Volume 3, Appendix 12.1**.

12.7 Basis for the Environmental Impact Assessment Report

12.7.1 Maximum design scenario

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

12.7.1.2 The assessment of the maximum adverse scenario for each receptor establishes the maximum potential adverse effect and as a result effects of greater adverse significance would not arise should any other scenario (as described in **Chapter 4: Project Description**) to that assessed within this Chapter be taken forward in the final Project design.

12.7.1.3 The maximum design scenario parameters that have been identified to be relevant to offshore and intertidal ornithology are outlined in **Table 12.11** and are in line with the Project design envelope (**Chapter 4: Project Description**).

Table 12.11 Maximum design scenario for impacts on offshore and intertidal ornithology

Impact / activity	Maximum design scenario parameter	Justification
Construction		
Impact C1: Direct temporary habitat loss / disturbance (OAA and offshore export cable corridor)	**Vessels:** See worst case assessment scenario for the shipping and navigation assessment in **Chapter 15: Shipping and Navigation**. Vessel type: • heavy lift vessel: 1 vessel, 12 round trips; • support vessel: 5 vessels, 90 round trips; • barge (if required): 1 vessel, 12 round trips; • Anchor Handling Tug Supply (AHTS) vessel: 14 vessels, 2,595 round trips; • survey vessel: 1 vessel, 20 round trips; • offshore construction vessel or larger AHTS vessel: 6 vessels, 859 round trips; • rock placement vessel: 4 vessels, 110 round trips. Up to 10 vessels would be onsite at any one time. It is estimated that approximately 3,838 individual vessels trips would be required over the 12-year construction stage. **OAA:** • deployment of wind turbines and other offshore infrastructure across the full OAA (684km^2). **Wind turbine generators (WTGs): 6.75km^2** • up to 225 WTGs; • mooring concepts: catenary;	This is the maximum area of temporary disturbance required for the installation within the OAA. This represents the maximum area that will be occupied both above and below the sea surface, that therefore influences habitat availability in the air, on the sea surface, and in the water column (relevant for diving birds).

Impact / activity	Maximum design scenario parameter	Justification
	- maximum seabed displacement: Anchor type: drag embedment[1] fully buried (breadth 12.5m). 300m drag length. Seabed impact of 3,750m² per anchor; and - total anchor disturbance (assuming 225 WTGs, each with 8 anchors) is 6.75km². **Array cables: 20.4km²** 225 array cables; 680km total array cable length; - assumed jet trenching installation method as worst-case for sediment mobilisation with 30m disturbance width; - temporary construction disturbance assumed 100% of total array cable length is buried by jet trenching; 680km x 0.03km = 20.4km² **Subsea distribution centres (SDC): 125,280m²** - up to 45 SDCs; - assumed worst-case is gravity base foundations; - SDC construction footprint: 58m x 48m, footprint is 2,784m² per SDC; and - total disturbance is 125,280m² for 45 SDCs. **Offshore substations: 57,200m²** 4 offshore substations with jacket foundations secured with suction caisson; - offshore substation construction footprint: 130m x 110m = 14,300m² per offshore substations; and - total disturbance is 57,200m² for four offshore substations; **Offshore export cables: 21km²** 5 offshore export cable trenches;	

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

Impact / activity	Maximum design scenario parameter	Justification
	• 140km offshore grid transmission route length per trench; • assumed jet trenching installation method as worst-case for sediment mobilisation with 30m disturbance width, • temporary construction disturbance assumed 100% of total export cable length is buried by jet trenching of 140km x 0.03km = 4.2km^2 per cable; and • total disturbance is 21km^2 for five cables. **Cable crossings: 714,000m^2** • 6 cable crossings per trench within the OAA with construction footprint of 170m x 30m = 5,100m^2, total of 153,000m^2 for 6 cable crossings for 5 cable trenches; and • 22 cable crossings along the offshore export cable corridor with construction footprint of 170m x 30m = 5,100m^2, total of 561,000m^2 for 22 cable crossings for 5 cable trenches. **Reactive compensation platforms (RCPs): 14,450m^2** • 2 RCPs with jacket foundations secured with suction caisson; construction footprint: 85m x 85m = 7,225m^2 (per RCP); and • total disturbance is 14,450m^2 for 2 RCP's.	
Impact C2: Direct temporary habitat loss / disturbance (offshore export cable corridor landfall)	**Landfall(s): 80m^2** • Scotstown, Lunderton North and Lunderton South; • 8 horizontal directional drilling (HDD) (or similar trenchless techniques)[2] ducts; HDD exit pit dimensions: assumed 5m x 2m as worst-case, 10m^2 per exit pit; and • total disturbance is 80m^2 for 8 exit pits. Landfall construction works duration: • Phase 1 – up to one year;	This is the maximum area of temporary disturbance required for the installation along the export cable corridor. For construction activities associated with the offshore export cable corridor, the assumption is that vessels would be *in situ* from start to finish so any disturbance events would be throughout the entire period.

[2] In relation to trenchless cable burial techniques, HDD has been presented in the EIA. Whilst other trenchless methods are available, HDD is presented herein as it is likely to have the largest construction impact.

Impact / activity	Maximum design scenario parameter	Justification
	• Phase 2 – up to one year; and • Phase 3 – up to one year.	
Impact C3: Indirect impacts due to effects on prey species and habitats (OAA and offshore export cable corridor)	See worst case assessment scenario for the benthic, epibenthic and intertidal ecology and shellfish assessment (Impacts C1 and C3) in **Chapter 10: Benthic, Epibenthic and Intertidal Ecology** and for the fish ecology assessment (Impacts C2 to C8) in **Chapter 13: Fish Ecology**.	
Operation and maintenance		
Impact O1: Indirect impacts due to effects on prey species and habitats (OAA)	See worst case assessment scenario for the benthic, epibenthic and intertidal ecology and shellfish assessment (Impacts O1 to O7) in **Chapter 10: Benthic, Epibenthic and Intertidal Ecology** and for the fish ecology (Impacts O1 to O11) in **Chapter 13: Fish Ecology**.	
Impact O2: Distributional responses (OAA)	**WTG** • Up to 225 WTGs (based on 14 megawatts (MW)). **Vessels** See worst case assessment scenario for the Shipping and Navigation assessment in **Volume 1, Chapter 15: Shipping and Navigation of the EIA Report**. Peak of up to 7 O&M vessels offshore with up to 364 round trips to port per year. **OAA** • deployment of wind turbines and other offshore infrastructure across the full OAA (684km^2).	The maximum Project footprint and the maximum extent of equipment needed so is considered to be the maximum design scenario for distributional response effects. Distributional responses would be assumed from the entire OAA that contains wind turbines and other associated structures, which maximises the potential for distributional responses. For operational and maintenance activities associated with upkeep and repair, the assumption is that vessels would be *in situ* from start to finish of such activities but that these would be limited in spatial extent and short lived. Any disturbance events would be temporary and from the limited spatial area at which repairs, or maintenance occurred.
Impact O3: Collision risk (OAA)	**WTG** • up to 225 WTGs (based on 14MW); and	Within **Volume 3, Appendix 12.3** two different turbine designs were modelled. The

Impact / activity	Maximum design scenario parameter	Justification
	• air gap of 22m (MHWS).	turbine design that produced the highest predicted mortality due to collisions has been concluded as the maximum design scenario taken forward and assessed within the EIA Report.
Impact O4: Entanglement with mooring lines (OAA)	• eight mooring lines per WTG floating unit equalling a total of 1,800 mooring lines.	The maximum mooring lines required so is considered to maximum-design scenario for assessment.
Decommissioning		
Impact D1: Direct temporary habitat loss / disturbance (OAA)	See worst case assessment scenario for the benthic, epibenthic and intertidal ecology and shellfish assessment (Impacts D1 to D5) in **Chapter 10: Benthic, Epibenthic and Intertidal Ecology** and for fish and shellfish ecology assessment (Impacts D1 to D70) in **Chapter 13: Fish Ecology**.	
Impact D2: Direct temporary habitat loss / disturbance (offshore export cable corridor)	See worst case assessment scenario for the benthic, epibenthic and intertidal ecology and shellfish assessment (Impacts D1 to D5) in **Chapter 10: Benthic, Epibenthic and Intertidal Ecology** and for fish and shellfish ecology assessment (Impacts D1 to D70) in **Chapter 13: Fish Ecology**.	

12.7.2 Embedded environmental measures

12.7.2.1 As part of the Project design process, a number of embedded environmental measures have been adopted to reduce the potential for adverse impacts on offshore and intertidal ornithology. These embedded environmental measures have evolved over the development process as the EIA has progressed and in response to consultation.

12.7.2.2 These measures also include those that have been identified as good or standard practice and include actions that would be undertaken to meet existing legislation requirements. As there is a commitment to implementing these embedded environmental measures, and also to various standard sectoral practices and procedures, they are considered inherently part of the design of the Project and are set out in the EIA Report.

12.7.2.3 **Table 12.12** sets out the relevant embedded environmental measures within the design and how these affect the offshore and intertidal ornithology assessment.

12.7.2.4 Further detail on the embedded environmental measures in **Table 12.12** is provided in **Volume 3, Appendix 5.2: Commitments Register**, which sets out how and where particular embedded environmental measures will be implemented and secured.

Table 12.12 Relevant offshore and intertidal ornithology embedded environmental measures

ID	Environmental measure proposed	Project stage measure introduced	How the environmental measures will be secured	Relevance to offshore and intertidal ornithology assessment
M-033	An **Outline Marine Pollution Contingency Plan** (MPCP) (Appendix to the **Outline Environmental Management Plan** (EMP)) has been submitted with this Application (**Volume 4**). This Outline MPCP outlines details of procedures to protect personnel working and to safeguard the marine environment and mitigation measures in the event of an accidental pollution event arising from offshore operations relating to the Project. The Final MPCP will be completed prior to construction commencing and submitted to MD-LOT for approval and will include relevant key emergency contact details.	Scoping Amended at EIA Report.	s.36 conditions and marine licences conditions.	Implementation of the EMP and specially the MPCP will reduce the potential for accidental pollution events which could directly and indirectly affect offshore and intertidal ornithology receptors.
M-038	An **Outline Lighting and Marking Plan** (LMP) has been submitted with this Application (**Volume 4**). The Final LMP will be completed prior to construction commencing and submitted to MD-LOT for approval. The LMP will confirm compliance with Northern Lighthouse Board requirements and in Line with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Recommendation G1162 (IALA, 2021) with regards to shipping, navigation and aviation marking and lighting during construction and operational and maintenance stage of the works.	Scoping Amended at EIA Report.	s.36 conditions and marine licences conditions.	Implementation of an LMP would limit the presence of artificial light and subsequent potential impacts to offshore and intertidal receptors.
M-046	There will be a minimum blade tip clearance of at least 22m above mean high water springs.	Scoping Amended at EIA Report.	s.36 conditions and marine licences conditions.	The minimum blade tip clearance of 22m above MHWS aligns with current industry standards and regulatory requirements. The measure contributes to mitigating the risk of direct collision for offshore ornithology receptors.

ID	Environmental measure proposed	Project stage measure introduced	How the environmental measures will be secured	Relevance to offshore and intertidal ornithology assessment
M-049	An **Outline Project Environmental Monitoring Programme** (PEMP) has been submitted with this Application (**Volume 4**). The Final PEMP will be completed prior to construction commencing and submitted to MD-LOT for approval. The Final PEMP will set out commitments to environmental monitoring in pre-, during and post-construction stages of the Project.	Scoping Amended at EIA Report.	s.36 conditions and marine licences conditions.	This measure would monitor potential impacts to offshore ornithology receptors during and post construction of the Project.
M-056	To reduce environmental impact of the landfall, a trenchless solution (e.g. HDD) is to be implemented to install ducts at landfall. Determination of the most suitable trenchless landfall crossing method will be undertaken during the detailed design stage of the Project, following geotechnical investigations of the onshore and nearshore areas.	Scoping Amended at EIA Report.	Project design, s.36 conditions and marine licences conditions.	The use of HDD minimises disturbance in the intertidal zone, and hence impacts to intertidal bird species.
M-106	The development of and adherence to a Decommissioning Programme. The Decommissioning Programme will outline measures for the decommissioning of the Project. The Decommissioning Programme would be submitted prior to construction commencing to MD-LOT and approved by Scottish Ministers prior to construction.	Scoping Amended at EIA Report.	Required under Sections 105 (Energy Act 2004) and marine licences consent conditions.	The implementation of a Decommissioning Programme would reduce potential impacts of the decommissioning of the project which could directly and indirectly affect offshore and intertidal ornithology receptors.
M-120	An **Outline Construction Method Statement** (CMS) has been submitted with this Application (**Volume 4**). The Final CMS will be completed prior to construction commencing and submitted to MD-LOT for approval. The Final CMS will include: a) details of the commence dates, duration and phasing of key elements of construction, working areas, the construction procedures and good working practices; b) details of the roles and responsibilities; and c) details of how the construction related mitigation step proposed are to be delivered.	EIA Report.	s.36 conditions and marine licences conditions.	The implementation of a CMS would mitigate potential impacts from construction of the Project which could directly and indirectly affect offshore and intertidal ornithology receptors.

ID	Environmental measure proposed	Project stage measure introduced	How the environmental measures will be secured	Relevance to offshore and intertidal ornithology assessment
M-121	An **Outline Environmental Management Plan** (EMP) has been submitted with this Application (**Volume 4**) and includes the following Appendix: - **Outline Marine Pollution Contingency Plan**. The Final EMP will be completed prior to construction commencing and submitted to MD-LOT for approval. The Final EMP will be implemented by the contractor(s). The contractor(s) will ensure that the relevant environmental measures within the EMP and health and safety procedures are implemented. The Final EMP will identify the project management structure roles and responsibilities with regard to managing and reporting on the environmental impact of the construction and O&M stages. Other measures that feed into the EMP include: - A Waste Management Plan (WMP) will be developed as an Appendix of the EMP post-submission to manage all waste generated during the construction and operation stages of the Project. The WMP will be appended to the Environmental Management Plan. The WMP will follow the principles of the waste hierarchy (Department for Environment, Food & Rural Affairs, 2001) which consists of: prevention, re-use, recycle, other recovery and disposal. - The Final Environmental Management Plan will include a Chemical Risk Assessment to identify, evaluate and mitigate potential environmental and health risks associated with the use, storage and disposal of hazardous substances during O&M and decommissioning stages of the Project. The EMP will be the securing mechanism for many measures.	EIA Report.	s.36 conditions and marine licences conditions.	The implementation of an EMP would mitigate potential impacts from construction of the Project which could directly and indirectly effect offshore and intertidal ornithology receptors.
M-122	Development of and adherence to a Offshore Operations and Maintenance Plan, which will confirm the Project's operations and maintenance activities. This will be submitted to MD-LOT for approval post-consent.	EIA Report.	s.36 conditions and marine licences conditions.	The implementation of an OOMP would mitigate potential impacts from operation and maintenance of the Project which could directly and indirectly affect offshore ornithology receptors.

12.8 Methodology for Environmental Impact Assessment Report

12.8.1 Introduction

12.8.1.1 The Project-wide approach to assessment is set out in **Chapter 5: Approach to EIA.** Whilst this has informed the approach that has been used in this offshore and intertidal ornithology assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of the offshore and intertidal ornithology assessment.

12.8.2 Significance evaluation methodology

Overview

12.8.2.1 The principles of determining potential impact significance from sensitivity of individual receptors and magnitude of impact are aligned with key guidance (Chartered Institute of Ecology and Environmental Management (CIEEM), 2024) and is informed by expert opinion where necessary.

12.8.2.2 The assessment approach follows the conceptual 'source-pathway-receptor' model. The conceptual model identifies likely environmental impacts on ornithology receptors resulting from the proposed construction, operation and maintenance, and decommissioning of the offshore infrastructure associated with the Project. This process provides an easy-to-follow assessment route between recognised potential impact sources and potentially sensitive receptors, ensuring a transparent impact assessment. The parameters of this conceptual model are defined as follows:

- source – the origin of a potential impact (noting that one source may have several pathways and receptors) for example, an activity such as offshore export cable installation and a resultant effect such as re-suspension of sediments;
- pathway – the means by which the effect of the activity could impact a receptor for example, following the above potential impact source re-suspended sediment could settle and smother the seabed; and
- receptor – the element of the receiving environment that is impacted for example, following the above potential impact source and pathway, seabirds which are unable to forage effectively due to a reduction in benthic prey availability.

12.8.2.3 Determination of receptor sensitivity, magnitude of change and significance of effect are provided in the **paragraphs 12.8.2.4** to **12.8.2.13**, utilising disturbance as a possible effect pathway.

Sensitivity of receptor

12.8.2.4 The overall sensitivity of a receptor is one of the core components of the assessment of potential impacts and their effects on ornithological receptors. Overall sensitivity to a receptor is determined based on their vulnerability to an effect pathway in conjunction with their conservation value.

12.8.2.5 The level of vulnerability for each receptor is informed by understanding of species ecology and known behavioural responses previously recorded to potential effect pathways posed by the Project. The overall confidence of the information used to define the vulnerability of each receptor has been critically appraised (with key findings presented within respective assessment sections), following a method adapted from Pérez-Domínguez *et al.* (2016) which considers three aspects of an evidence base:

- Quality of information: highest quality information from peer-reviewed papers (either observation or experimental), or grey literature from reputable sources. Heavier reliance on grey literature and / or expert judgement is considered to represent a lower quality evidence base;
- Applicability of evidence: evidence based on the same impacts, arising from similar activities, on the same species, in the same geographical area, is considered to have the highest associated confidence, followed by similar pressures / activities / species in other areas, followed by proxy information; and
- Concordance: situations where available evidence is in broad agreement in terms of sensitivity and magnitude of impact results in a higher confidence compared to a situation where evidence is only in partial agreement, or not in agreement at all.

12.8.2.6 It's important to note vulnerability can differ between similar species and between different populations of the same species. Thus, the behavioural responses of ornithology receptors are likely to vary with both the nature and context of the stimulus and the experience of the individual bird.

12.8.2.7 In addition, individual birds of the same species may differ in their vulnerability depending on the regularity of exposure to an effect pathway, resulting in some degree of habituation (for example, individuals that forage within close proximity to an area with high anthropogenic activity levels may have a greater tolerance than those that occupy remote locations with little or no anthropogenic presence).

12.8.2.8 Conservation value of a species is also used to provide additional context to the overall sensitivity of a receptor, and has been used to refine predictions, as appropriate. Conservation value and sensitivity are not necessarily linked for a particular impact. Therefore, each receptor's conservation value is considered using reasoned judgement when determining their overall sensitivity to any potential impact. As an example, a receptor could be classified as high conservation value (for example, all birds affected are expected to be qualifying feature of a SPA) but have a low or very low sensitivity to an effect (or vice-versa), thus leading to an overall sensitivity value of low at most. Such reasoned judgement is an important part of the overall narrative used to determine potential impact significance and is used, where relevant, as a mechanism for modifying the sensitivity of an effect assigned to a specific receptor.

12.8.2.9 The conservation value of ornithological receptors is based on the population from which individuals potentially impacted by the Project are predicted to originate from. This is determined from current understanding of the movements of bird species presented in relevant literature or recorded from tracking studies. Definition, therefore, corresponds to the degree of connectivity predicted between the Project and designated populations. Using this approach, the conservation importance of a species seen at different times of year may fall into any of the defined categories. Population status is also taken into account in the assessment. For example, effects on a declining species may be of more concern than those on an increasing species.

12.8.2.10 Example definitions of both vulnerability and conservation value for ornithology receptors are provided in **Table 12.13**. The overall sensitivity of relevant ornithology receptors has been concluded within **Table 12.17** and **Table 12.18** for offshore and intertidal ornithology receptors, respectively.

Table 12.13 Definitions for vulnerability and conservation value of ornithology receptors

Conservation value or sensitivity	Definition
High	**Vulnerability** Receptor has very limited tolerance of a potential impact. For example, strongly displaced by sources of disturbance such as noise, light, vessel movements and the presence of people.
	Conservation value All receptors recorded expected to be qualifying features of an internationally designated site (for example, SPA or Ramsar). Receptor population present within the Project of sufficient conservation importance to meet criteria for SPA selection. Receptor listed under the UK Birds of Conservation Concern 5 (BoCC5) Red List (Stanbury *et al.,* 2021; Stanbury *et al.,* 2024) or afforded special protection under Schedule 1 of Wildlife and Countryside Act 1981 or Annex 1 of Birds Directive. For example, a receptor population for which all individuals at risk can be clearly connected to a particular conservation site of international importance.
Medium	**Vulnerability** Receptor has limited tolerance of a potential impact. For example, moderately displaced by sources of disturbance such as noise, light, vessel movements and the presence of people.
	Conservation value Receptors recorded expected to be notified feature of a nationally designated site (for example, SSSI). Receptor population present with sufficient conservation importance to meet criteria for SSSI selection. SSSI species selection criteria focus on identifying areas supporting nationally important wildlife or geological features, such as rare species, important habitats, or large aggregations of specific species, often using thresholds of 1% of the British population for bird colonies. Receptor listed under BoCC5 Red or Amber List (Stanbury *et al.,* 2021; Stanbury *et al.,* 2024) or afforded special protection under Schedule 1 or Annex 1 of Birds Directive. For example, a receptor population for which individuals at risk may be drawn from a mixture of conservation sites of international, national importance and other populations which may also contribute to individuals at risk.
Low	**Vulnerability** Receptor has some tolerance of a potential impact. For example, partially displaced by sources of disturbance such as noise, light, vessel movements and the presence of people.

Conservation value or sensitivity	Definition
	Conservation value Receptors occurring within SPAs, Ramsar sites and SSSIs, but not crucial to the integrity of the site. Receptor population present falling short of SSSI selection criteria but with sufficient conservation importance likely to meet criteria for selection as a local site. Receptor may be listed either as Amber or Green Listed under BoCC5 (Stanbury *et al.,* 2021; Stanbury *et al.,* 2024) or afforded special protection under Schedule 1 or Annex 1 of Birds Directive but not present in locally important numbers or likely to utilise the OAA. For example, a receptor population for which individuals at risk have no known connectivity to conservation sites of international or national importance.
Very low	**Vulnerability** Receptor is generally tolerant of a potential impact. For example, not displaced by sources of disturbance such as noise, light, vessel movements and the presence of people.
	Conservation value All other species that are widespread and common and which are not present in locally important (or greater) numbers, and which are of low conservation concern, for example, UK Birds of Conservation Concern 5 (BoCC5) Green List species (Stanbury *et al.* 2021; Stanbury *et al.* 2024).

Magnitude of changes

12.8.2.11 Potential Impacts on receptors are judged in terms of their magnitude. Magnitude refers to the scale of an impact and is determined on a quantitative basis where feasible and appropriate. For ornithology receptors this typically relates to the predicted loss of individuals from a defined population. Magnitude is assessed within four levels, as detailed in **Table 12.14**.

Table 12.14 Definitions for impact magnitude in relation to ornithology receptors

Magnitude	Definition
High	A change in the size or extent of distribution of the relevant biogeographic population or the population that is the interest feature of a specific protected site that is predicted to irreversibly alter the population in the short to long-term and to alter the long-term viability of the population and / or the integrity of the protected site. Recovery from that change predicted to be achieved in the long-term (for instance, more than five years) following cessation of the development activity.
Medium	A change in the size or extent of distribution of the relevant biogeographic population or the population that is the interest feature of a specific protected site that occurs in the short and long-term, but which is not predicted to alter

Magnitude	Definition
	the long-term viability of the population and / or the integrity of the protected site. Recovery from that change predicted to be achieved in the medium-term (for instance, no more than five years) following cessation of the development activity.
Low	A change in the size or extent of distribution of the relevant biogeographic population or the population that is the interest feature of a specific protected site that is sufficiently small-scale or of short duration to cause no long-term harm to the feature / population. Recovery from that change predicted to be achieved in the short-term (for instance, no more than one year) following cessation of the development activity.
Very low	Limited to no change of the size or extent of distribution of the relevant biogeographic population or the population that is the interest feature of a specific protected site. Recovery from that change is predicted to be rapid (for instance, no more than c. six months) following cessation of the development activity.

Significant evaluation

12.8.2.12 CIEEM guidelines (2024) use only two categories to classify effects: “significant” or “not significant”. During the assessment of effects for each identified receptor, the value in **Table 12.13** will be combined with the magnitude of change from **Table 12.14** to produce an overall significance rating based on the evaluation matrix shown in **Table 12.15**. As a general rule, **Major** and **Moderate** effects are considered to be **Significant** and **Minor** and **Negligible** effects are considered to be **Not Significant**. However, professional judgement is applied, where appropriate, to determine significance of effect. Where effects are assessed, according to the matrix in **Table 12.15** to be **Potentially Significant** in EIA terms, professional judgement is applied to determine whether they are **Significant** or **Not Significant**. Definitions of each level of effect significance are provided in **Table 12.16**.

12.8.2.13 The use of expert judgement is an important element of the impact assessment process as the matrix approach only provides a framework to aid understanding of how a judgement has been informed and reached for each specific receptor to any given impact being assessed.

12.8.2.14 Where the residual effect is classified as significant in EIA terms (based on the matrix presented within **Table 12.15** and consideration of expert judgement), appropriate mitigation is considered, where feasible. The aim of embedded environmental measures is to avoid or reduce the overall impact in order to determine a residual effect of non-significance upon a given receptor.

12.8.2.15 Following initial assessment, if the effect does not require additional mitigation (or none is possible), the residual effect would remain the same. If, however, additional mitigation is proposed, an assessment of the post-mitigation residual effect is provided.

12.8.2.16 Effects are more likely to be considered significant where they affect ornithology receptors of higher overall sensitivity or where the magnitude of the impact is high. Effects not considered to be significant would be those where the integrity of the receptor is not threatened, effects on receptor of lower overall sensitivity, or where the magnitude of the impact is very low.

Table 12.15 Matrix of effect significance

		Magnitude of change			
		High	**Medium**	**Low**	**Negligible**
Value / Sensitivity	**High**	**Major (Significant).**	**Major (Significant).**	**Moderate (Potentially Significant).**	**Minor (Not Significant).**
	Medium	**Major (Significant).**	**Moderate (Potentially Significant).**	**Minor (Not Significant).**	**Minor (Not Significant).**
	Low	**Moderate (Potentially Significant).**	**Minor (Not Significant).**	**Minor (Not Significant).**	**Negligible (Not Significant).**
	Very low	**Minor (Not Significant).**	**Minor (Not Significant).**	**Negligible (Not Significant).**	**Negligible (Not Significant).**

Table 12.16 Definitions of effect significance

Significance	Definition
Major	Large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible change in receptor condition.

12.8.3 Evaluation of receptors

12.8.3.1 The assessment of impacts follows CIEEM guidelines (CIEEM, 2024) with regards to the emphasis being on "*significant effects rather than all ecological effects*". Therefore, potential receptors that are determined to be of low or negligible sensitivity to a given effect pathway are not considered further in this assessment. Significant effects on these species are not predicted given their infrequent occurrence in the survey area, low conservation status or lack of sensitivity to a potential effect pathway. The Applicant's justification for scoping in or out offshore ornithological receptors is provided in **Table 12.17**. The receptors considered are those identified within the baseline environment as described in **Section 12.6**.

12.8.3.2 For intertidal receptors, scoped in receptors are those recorded in important numbers as identified in **Volume 3, Appendix 12.1**, representing species recorded in numbers >1% of the UK population and/or >1% of a nearby SPA population. These receptors are presented in **Table 12.18**.

Table 12.17 Evaluation of offshore ornithology receptors requiring assessments for identified effect pathways

Receptor	Vulnerability*	Conservation value	Peak abundance within OAA plus 4km buffer (individuals)	Frequency of months recorded within OAA plus 4km buffer	Overall sensitivity value	Effect pathways requiring assessment for each Project stage		
						Construction	O&M	Decommissioning
Arctic tern	Distributional responses (OAA) – **Low**.	**Medium** – no designated sites of international or national importance have breeding season connectivity to the Project. Species is BoCC5a red-listed (Stanbury *et al.*, 2024).	124	4	**Low**	No effect pathway	**xf**	No effect pathway
	Direct temporary habitat loss / disturbance (OAA) – **Low**.				**Low**	**xb**	No effect pathway	**xb**
	Collision risk – **High**.				**Low**	No effect pathway	**xo**	No effect pathway
	Entanglement with mooring lines – **Low**.				**Low**	No effect pathway	**xd**	No effect pathway
	Indirect impacts due to effects on prey species and habitats – **Low**.				**Low**	**xo**	**xo**	No effect pathway
Kittiwake	Distributional responses (OAA) – **Low**.	**Medium** – Individuals recorded within	1,818	24	**Low**	No effect pathway	**✓a**	No effect pathway

Receptor	Vulnerability*	Conservation value	Peak abundance within OAA plus 4km buffer (individuals)	Frequency of months recorded within OAA plus 4km buffer	Overall sensitivity value	Effect pathways requiring assessment for each Project stage		
						Construction	O&M	Decommissioning
	Direct temporary habitat loss / disturbance (OAA) – **Low**.	the Project may be drawn from a mixture of designated sites of international and national importance and other populations which may also contribute to individuals at risk. Species is BoCC5red-listed (Stanbury *et al.*, 2024).			**Low**	**xb**	No effect pathway	**xb**
	Collision risk – **High**.				**Medium**	No effect pathway	**✓c**	No effect pathway
	Entanglement with mooring lines – **Low**.				**Low**	No effect pathway	**xd**	No effect pathway
	Indirect impacts due to effects on prey species and habitats – **Medium**.				**Medium**	**✓e**	**✓e**	No effect pathway
Common gull	Distributional responses (OAA) – **Low**.	**Medium** – no designated sites of international or national importance have breeding season connectivity to	23	1	**Low**	No effect pathway	**xf**	No effect pathway
	Direct temporary habitat loss / disturbance (OAA) – **Low**.				**Low**	**xb**	No effect pathway	**xb**

Receptor	Vulnerability*	Conservation value	Peak abundance within OAA plus 4km buffer (individuals)	Frequency of months recorded within OAA plus 4km buffer	Overall sensitivity value	Effect pathways requiring assessment for each Project stage		
						Construction	O&M	Decommissioning
	Collision risk – **High**.	the Project. Species is BoCC5a red-listed (Stanbury *et al.*, 2024).			**Low**	No effect pathway	**xn**	No effect pathway
	Entanglement with mooring lines – **Low**.				**Low**	No effect pathway	**xd**	No effect pathway
	Indirect impacts due to effects on prey species and habitats – **Low**.				**Low**	**xg**	**xg**	No effect pathway
Great black-backed gull	Distributional responses (OAA) – **Low**.	**Medium** – no designated sites of international or national importance have breeding season connectivity to the Project. Species is BoCC5a red-listed (Stanbury *et al.*, 2024).	1,064	16	**Low**	No effect pathway	**xf**	No effect pathway
	Direct temporary habitat loss / disturbance (OAA) – **Low**.				**Low**	**xb**	No effect pathway	**xb**
	Collision risk – **High**.				**Medium**	No effect pathway	**✓c**	No effect pathway
	Entanglement with mooring lines – **Low**.				**Low**	No effect pathway	**xd**	No effect pathway

Receptor	Vulnerability*	Conservation value	Peak abundance within OAA plus 4km buffer (individuals)	Frequency of months recorded within OAA plus 4km buffer	Overall sensitivity value	Effect pathways requiring assessment for each Project stage		
						Construction	O&M	Decommissioning
	Indirect impacts due to effects on prey species and habitats – **Low**.				**Low**	**xg**	**xg**	No effect pathway
Herring gull	Distributional responses (OAA) – **Low**.	**Medium** – no designated sites of international or national importance have breeding season connectivity to the Project. Species is BoCC5a red-listed (Stanbury *et al.*, 2024).	315	11	**Low**	No effect pathway	**xf**	No effect pathway
	Direct temporary habitat loss / disturbance (OAA) – **Low**.				**Low**	**xb**	No effect pathway	**xb**
	Collision risk – **High**.				**Medium**	No effect pathway	**✓c**	No effect pathway
	Entanglement with mooring lines – **Low**.				**Low**	No effect pathway	**xd**	No effect pathway
	Indirect impacts due to effects on prey species and habitats – **Low**.				**Low**	**xg**	**xg**	No effect pathway

Receptor	**Vulnerability***	**Conservation value**	**Peak abundance within OAA plus 4km buffer (individuals)**	**Frequency of months recorded within OAA plus 4km buffer**	**Overall sensitivity value**	**Effect pathways requiring assessment for each Project stage**		
						Construction	**O&M**	**Decommissioning**
Lesser black-backed gull	Distributional responses (OAA) – **Low**.	**Medium** – no designated sites of international or national importance have breeding season connectivity to the Project. Species is BoCC5a amber-listed (Stanbury *et al.*, 2024).	8	2	**Low**	No effect pathway	**xf**	No effect pathway
	Direct temporary habitat loss / disturbance (OAA) – **Low**.				**Low**	**xb**	No effect pathway	**xb**
	Collision risk – **High**.				**Medium**	No effect pathway	**✓c**	No effect pathway
	Entanglement with mooring lines – **Low**.				**Low**	No effect pathway	**xd**	No effect pathway
	Indirect impacts due to effects on prey species and habitats – **Low**.				**Low**	**xg**	**xg**	No effect pathway
Arctic skua	Distributional responses (OAA) – **Low**.	**Medium** – no designated sites of international or national importance have breeding	8	2	**Low**	No effect pathway	**xf**	No effect pathway
	Direct temporary habitat loss /				**Low**	**xb**	No effect pathway	**xb**

Receptor	Vulnerability*	Conservation value	Peak abundance within OAA plus 4km buffer (individuals)	Frequency of months recorded within OAA plus 4km buffer	Overall sensitivity value	Effect pathways requiring assessment for each Project stage		
						Construction	O&M	Decommissioning
	disturbance (OAA) – **Low**.	season connectivity to the Project. Species is BoCC5a amber-listed (Stanbury *et al.*, 2024).						
	Collision risk – **High**.				**Low**	No effect pathway	**xn**	No effect pathway
	Entanglement with mooring lines – **Low**.				**Low**	No effect pathway	**xd**	No effect pathway
	Indirect impacts due to effects on prey species and habitats – **Low**.				**Low**	**xg**	**xg**	No effect pathway
Great skua	Distributional responses (OAA) – **Low**.	**Medium** – Individuals recorded within the Project may be drawn from a mixture of designated sites of international and national importance and other	54	4	**Low**	No effect pathway	**xf**	No effect pathway
	Direct temporary habitat loss / disturbance (OAA) – **Low**.				**Low**	**xb**		**xb**
	Collision risk – **High**.				**Medium**	No effect pathway	**✓c**	No effect pathway

Receptor	Vulnerability*	Conservation value	Peak abundance within OAA plus 4km buffer (individuals)	Frequency of months recorded within OAA plus 4km buffer	Overall sensitivity value	Effect pathways requiring assessment for each Project stage		
						Construction	O&M	Decommissioning
	Entanglement with mooring lines – **Low**	populations which may also contribute to individuals at risk. Species is BoCC5a red-listed (Stanbury *et al.,* 2024).			**Low**	No effect pathway	**xd**	No effect pathway
	Indirect impacts due to effects on prey species and habitats – **Low**.				**Low**	**xg**	**xg**	No effect pathway
Guillemot	Distributional responses (OAA) – **Medium**.	**Medium** – Individuals recorded within the Project are moderately linked to designated sites of international and national importance (for example, Buchan Ness to Collieston Coast SPA) and other populations, which may also contribute to	24,448	24	**Medium**	No effect pathway	**✓h**	No effect pathway
	Direct temporary habitat loss / disturbance (OAA) – **Medium**				**Medium**	**✓i**	No effect pathway	**✓i**
	Collision risk – **Low**.				**Low**	No effect pathway	**xj**	No effect pathway
	Entanglement with mooring lines – **Medium**.				**Medium**	No effect pathway	**✓k**	No effect pathway

Receptor	Vulnerability*	Conservation value	Peak abundance within OAA plus 4km buffer (individuals)	Frequency of months recorded within OAA plus 4km buffer	Overall sensitivity value	Effect pathways requiring assessment for each Project stage		
						Construction	O&M	Decommissioning
	Indirect impacts due to effects on prey species and habitats – **Medium**.	individuals at risk. Species is BoCC5a amber-listed (Stanbury *et al.*, 2024).			**Medium**	**✓e**	**✓e**	No effect pathway
Razorbill	Distributional responses (Array) – **Medium**.	**Medium** – Individuals recorded within the Project are moderately linked to designated sites of international and national importance (for example, Buchan Ness to Collieston Coast SPA) and other populations which may also contribute to individuals at risk. Species is BoCC5a amber-listed	2,412	21	**Medium**	No effect pathway	**✓h**	No effect pathway
	Direct temporary habitat loss / disturbance (OAA) – **Medium**.				**Medium**	**✓i**	No effect pathway	**✓i**
	Collision risk – **Low**.				**Low**	No effect pathway	**xj**	No effect pathway
	Entanglement with mooring lines – **Medium**.				**Medium**	No effect pathway	**✓k**	No effect pathway
	Indirect impacts due to effects on prey species				**Medium**	**✓e**	**✓e**	No effect pathway

Receptor	Vulnerability*	Conservation value	Peak abundance within OAA plus 4km buffer (individuals)	Frequency of months recorded within OAA plus 4km buffer	Overall sensitivity value	Effect pathways requiring assessment for each Project stage		
						Construction	O&M	Decommissioning
	and habitats – **Medium**.	(Stanbury *et al.*, 2024).						
Puffin	Distributional responses (OAA) – **Medium**.	**High** – Individuals recorded within the Project are moderately linked to designated sites of international and national importance (for example, Forth Islands SPA) and other populations which may also contribute to individuals at risk. Species is BoCC5a red-listed (Stanbury *et al.*, 2024).	1,064	16	**Medium**	No effect pathway	**✓h**	No effect pathway
	Direct temporary habitat loss / disturbance (OAA) – **Medium**.				**Medium**	**✓i**	No effect pathway	**✓i**
	Collision risk – **Low**.				**Low**	No effect pathway	**xj**	No effect pathway
	Entanglement with mooring lines – **Medium**.				**Medium**	No effect pathway	**✓k**	No effect pathway
	Indirect impacts due to effects on prey species and habitats – **Medium**.				**Medium**	**✓e**	**✓e**	No effect pathway
Little auk	Distributional responses	**Low** – no designated	25	1	**Low**	No effect pathway	**xn**	No effect pathway

Receptor	Vulnerability*	Conservation value	Peak abundance within OAA plus 4km buffer (individuals)	Frequency of months recorded within OAA plus 4km buffer	Overall sensitivity value	Effect pathways requiring assessment for each Project stage		
						Construction	O&M	Decommissioning
	(OAA) – **Medium**.	sites of international or national importance have breeding season connectivity to the Project.						
	Direct temporary habitat loss / disturbance (OAA) – **Medium**.				**Low**	**xn**	No effect pathway	**xn**
	Collision risk – **Low**.				**Low**	No effect pathway	**xj**	No effect pathway
	Entanglement with mooring lines – **Medium**.				**Low**	No effect pathway	**xn**	No effect pathway
	Indirect impacts due to effects on prey species and habitats – **Medium**.				**Low**	**xo**	**xo**	No effect pathway
Red-throated diver	Distributional responses (OAA) – **High**.	**Low** – no designated sites of international or national importance have breeding	8	1	**Low**	No effect pathway	**xn**	No effect pathway
	Direct temporary habitat loss /				**Low**	**xn**	No effect pathway	**xn**

Receptor	Vulnerability*	Conservation value	Peak abundance within OAA plus 4km buffer (individuals)	Frequency of months recorded within OAA plus 4km buffer	Overall sensitivity value	Effect pathways requiring assessment for each Project stage		
						Construction	O&M	Decommissioning
	disturbance (OAA) – **High**.	season connectivity to the Project. Species is BoCC5a green-listed (Stanbury *et al.*, 2021).						
	Collision risk – **Low**.				**Low**	No effect pathway	**xj**	No effect pathway
	Entanglement with mooring lines – **Medium**.				**Low**	No effect pathway	**xn**	No effect pathway
	Indirect impacts due to effects on prey species and habitats – **Low**.				**Low**	**xo**	**xo**	No effect pathway
Storm petrel	Distributional responses (OAA) – **Low**.	**Medium** – Individuals recorded within the Project may be drawn from a mixture of designated sites of international and national importance and other	298	2	**Low**	No effect pathway	**xf**	No effect pathway
	Direct temporary habitat loss / disturbance (OAA) – **Low**.				**Low**	**xb**	No effect pathway	**xb**
	Collision risk – **Low**.				**Low**	No effect pathway	**xj**	No effect pathway

Receptor	Vulnerability*	Conservation value	Peak abundance within OAA plus 4km buffer (individuals)	Frequency of months recorded within OAA plus 4km buffer	Overall sensitivity value	Effect pathways requiring assessment for each Project stage		
						Construction	O&M	Decommissioning
	Entanglement with mooring lines – **Low**.	populations which may also contribute to individuals at risk. Species is BoCC5a amber-listed (Stanbury et al., 2024).			**Low**	No effect pathway	**xd**	No effect pathway
	Indirect impacts due to effects on prey species and habitats – **Low**.				**Low**	**xo**	**xo**	No effect pathway
Fulmar	Distributional responses (OAA) – **Low**.	**Medium** – Individuals recorded within the Project may be drawn from a mixture of designated sites of international and national importance and other populations which may also contribute to individuals at risk. Species is BoCC5a amber-listed (Stanbury *et al.*, 2024).	3,765	24	**Low**	No effect pathway	**✓l**	No effect pathway
	Direct temporary habitat loss / disturbance (OAA) – **Low**.				**Low**	**xb**	No effect pathway	**xb**
	Collision risk – **Low**.				**Low**	No effect pathway	**xj**	No effect pathway
	Entanglement with mooring lines – **Low**.				**Low**	No effect pathway	**xd**	No effect pathway
	Indirect impacts due to effects on prey species				**Low**	**xm**	**xm**	No effect pathway

Receptor	Vulnerability*	Conservation value	Peak abundance within OAA plus 4km buffer (individuals)	Frequency of months recorded within OAA plus 4km buffer	Overall sensitivity value	Effect pathways requiring assessment for each Project stage		
						Construction	O&M	Decommissioning
	and habitats – **Low**.							
Manx shearwater	Distributional responses (OAA) – **Low**.	**Medium** – Individuals recorded within the Project may be drawn from a mixture of designated sites of international and national importance and other populations which may also contribute to individuals at risk. Species is BoCC5a amber-listed (Stanbury *et al.*, 2024).	17	3	**Low**	No effect pathway	**xf**	No effect pathway
	Direct temporary habitat loss / disturbance (OAA) – **Low**.				**Low**	**xb**	No effect pathway	**xb**
	Collision risk – **Low**.				**Low**	No effect pathway	**xj**	No effect pathway
	Entanglement with mooring lines – **Low**.				**Low**	No effect pathway	**xd**	No effect pathway
	Indirect impacts due to effects on prey species and habitats – **Low**.				**Low**	**xm**	**xm**	No effect pathway
Gannet	Distributional responses (OAA) – **Medium**.	**Medium** – Individuals recorded within the Project are	2,814	24	**Medium**	No effect pathway	**✓h**	No effect pathway

Receptor	Vulnerability*	Conservation value	Peak abundance within OAA plus 4km buffer (individuals)	Frequency of months recorded within OAA plus 4km buffer	Overall sensitivity value	Effect pathways requiring assessment for each Project stage		
						Construction	O&M	Decommissioning
	Direct temporary habitat loss / disturbance (OAA) – **Medium**.	highly linked to designated sites of international and national importance (for example, Forth Islands SPA). Species is BoCC5a amber-listed (Stanbury *et al.,* 2024).			**Medium**	**xb**	No effect pathway	**xb**
	Collision risk – **High**.				**Medium**	No effect pathway	**✓c**	No effect pathway
	Entanglement with mooring lines – **Medium**.				**Medium**	No effect pathway	**✓k**	No effect pathway
	Indirect impacts due to effects on prey species and habitats – **Low**.				**Low**	**xm**	**xm**	No effect pathway

Table notes: * vulnerability informed from appropriate literature within **Table 12.5**.

Scoping conclusions references:
a - Although literature evidence (**Section 12.10.1.2**; **Table 12.5**) suggests kittiwake is insensitive to distributional response effects, the receptor has been screened in for assessment at the request of NatureScot (**Table 12.1**).
b - Literature evidence (**Table 12.5**) suggest receptor is insensitive to the presence of vessels, and in some instances may exhibit an attraction effect, which for some receptors has been recorded within the Project study area. When combined with the spatially limited and temporary nature of the activity the potential for a significant effect can be confidently ruled out.
c - Literature evidence (**Table 12.5**) suggests receptor is at potential risk of collision.
d - Receptor does not dive to depths where potential for entanglement could occur when foraging, therefore no potential for effect pathway to occur.
e - Literature evidence (**Table 12.5**) suggests that receptor is susceptible to changes in prey availability.
f - Literature evidence (**Table 12.5**) suggest receptor is insensitive to distributional response effects.

g - Receptor is not limited to foraging solely in the marine environment. They are generalist and opportunistic, with a highly adaptable feeding strategy inclusive of surface feeding, scavenging, kleptoparasitism, terrestrial foraging and/or predation (Burnell *et al.,* 2023). Any indirect effects on prey species and habitats are therefore not expected to significantly impact the receptor.
h - Literature evidence (**Section 12.10.1.2**; **Table 12.5**) suggests receptor may be sensitive to distributional response effects.
i - Literature evidence (**Table 12.5**) suggests receptor may be sensitive to temporary habitat loss / disturbance.
j - Literature evidence (**Table 12.5**) suggests receptor does not fly routinely at heights which would pose a significant risk of collision.
k - Receptors diving behaviour means receptor is at potential risk of entanglement.
l - Fulmar has been considered further for distributional response effects at the request of NatureScot (**Table 12.1**), despite the species expected low sensitivity to the effect pathway.
m - Due to the receptors foraging strategy of long distance, energy efficient foraging flights (Masden *et al.,* 2010), receptor is not considered sensitive to any spatially limited and temporary changes in prey availability.
n - Receptor was recorded infrequently and with low abundance, therefore the potential for a significant population-level effect can be confidently ruled out.

Table 12.18 Evaluation of intertidal ornithology receptors requiring assessments for identified effect pathways (temporary habitat loss / disturbance in the export cable corridor landfall only)

Receptor	Vulnerability*	Conservation Value	Overall sensitivity Value	Effect pathways requiring assessment for each project stage		
				Construction	O&M	Decommissioning
Herring gull	**Low**	Medium – no designated sites of international or national importance have breeding season connectivity to the Project. Species are BoCC5a red-listed (Stanbury *et al.*, 2024).	**Low**	✓	No effect pathway.	✓
Sandwich tern	**High**	High – BoCC5a amber-listed (Stanbury *et al.*, 2024) and Birds Directive Annex 1 listed. Individuals highly linked to the nearby Loch of Strathbeg SPA designated for Sandwich tern.	**High**	✓	No effect pathway.	✓
Guillemot	**Medium**	Medium – Individuals recorded during VP surveys are moderately linked to designated sites of international and national importance (for example, Buchan	**Medium**	✓	No effect pathway.	✓

Receptor	Vulnerability*	Conservation Value	Overall sensitivity Value	Effect pathways requiring assessment for each project stage		
				Construction	O&M	Decommissioning
		Ness to Collieston Coast SPA) and other populations which may also contribute to individuals at risk. Species are BoCC5a amber-listed (Stanbury *et al.*, 2024).				
Shag	**Medium**	Medium – Individuals recorded during VP surveys linked to the Buchan Ness to Collieston Coast SPA. Shag are also BoCC5a amber-listed (Stanbury *et al.*, 2024).	**Medium**	✓	No effect pathway.	✓
Eider	**Medium**	High – BoCC5a Amber-listed (Stanbury *et al.*, 2021), Annex 1 listed, and Schedule 1 listed.	**Medium**	✓	No effect pathway.	✓

Table notes: * Behavioural sensitivity informed from appropriate literature within **Table 12.5.**

12.9 Assessment of effects: Construction stage

12.9.1 Introduction

12.9.1.1 This Section provides an assessment of the effects for offshore and intertidal ornithology from the construction of the Project.

12.9.1.2 The assessment methodology set out in **Section 12.8** has been applied to assess effects to offshore and intertidal ornithology from the Project.

12.9.2 Impact C1: direct temporary habitat loss / disturbance (Option Agreement Area and offshore export cable corridor)

Overview

12.9.2.1 The maximum assessment scenario relating to direct temporary habitat loss / disturbance in the OAA and offshore export cable corridor is presented in **Table 12.11**. Where predicted effects are identified, an assessment of the magnitude of change for each effect has been completed based on the methodology provided in **Section 12.8.2**. The magnitude of change, and hence the significance of potential effects has been assessed on the assumption that the embedded environmental measures from **Table 12.12** have been implemented as part of the Project.

12.9.2.2 As per NatureScot advice (see **Section 12.3),** a quantitative assessment of temporary habitat loss / disturbance in the OAA due to the presence of offshore infrastructure is not required, with the worst case with respect to distributional responses already considered within the operational stage (see **Section 12.10.2**). This impact pathway therefore, only considers increased vessel activity associated with construction of the Project during the construction stage.

12.9.2.3 Following the outcome of the screening process presented in **Section 12.8.3**, the receptors undergoing assessment for direct temporary habitat loss / disturbance due to the presence of vessels include:

- guillemot;
- razorbill; and
- puffin.

Sensitivity or value of receptor

12.9.2.4 As detailed within **Table 12.17**, the overall sensitivity of all receptors scoped in for assessment of direct temporary habitat loss / disturbance is **medium**.

Magnitude of impact

12.9.2.5 During the construction stage of the Project, various vessels will be required for site preparation, installation of WTGs, cable corridors, and general support. These activities have the potential to cause temporary habitat loss, and consequent displacement, of offshore ornithological receptors from the OAA and offshore component of the export cable corridor, potentially leading to increased energetic expenditure and loss of key habitats for individuals flushed from the area (Garthe and Hüppop, 2004).

12.9.2.6 Displaced birds may be forced into areas already occupied by others, increasing intra- and inter-specific competition for limited resources. Alternatively, they may relocate to lower-quality habitats with reduced prey availability or face longer travel distances to suitable foraging grounds. These pressures could negatively affect both displaced and resident birds, impacting survival and breeding success.

12.9.2.7 Although guillemot, razorbill and puffin are considered moderately sensitive to vessel disturbance due to their limited habitat flexibility and specialist foraging behaviours (Furness *et al.,* 2013), their sensitivity is largely context dependant (for example, vessel size, speed, noise). Fliessbach *et al.* (2019) calculate a traffic disturbance vulnerability index (DVI) for Northwest European seabirds, calculating the risk of disturbance for a range of seabird species in the German North and Baltic Seas. For guillemot and razorbill, responses were variable, with 17% of guillemot recorded flying away from a vessel, and 20% escape diving (n=929), and 65% of razorbill flying away, with 13% escape diving (n=293). Mean escape distances for these species were 127m (+/- 113m), and 395m (+/- 216m) for guillemot and razorbill respectively. Puffin was not considered in this study, though sensitivity is considered to be similar as they exhibit similar ecology and foraging behaviour.

12.9.2.8 While species may vary in their vulnerability to vessel traffic, the overall impact is expected to be minimal. Construction activity will be spatially and temporally limited, with vessels operating in discrete areas rather than across the entire array simultaneously. Once vessels leave an area, displaced birds are expected to return.

12.9.2.9 The vessel numbers anticipated throughout the construction stage of the Project are described in **Chapter 4: Project Description**. It is anticipated that approximately 10 vessels would be on site at any one time during the construction of the Project. It is estimated that approximately 3,838 individual vessels transits (each representing a one-way journey between port and worksite) would be required during the construction of the Project. It is estimated that the installation of each floating unit will require up to three vessel transits of the installation vessel.

12.9.2.10 Relevant embedded environmental measures (M-032) are described (**Table 12.12**).

12.9.2.11 The export cable corridor is not known to be routed through any areas designated for foraging or resting birds that are sensitive to vessel movements such as common scoter, red-throated diver or auks. In line with **Table 12.14**, definitions of potential impact magnitudes, there is expected to be very limited change in the distribution of any birds residing within the export cable corridor that is highly unlikely to affect their respective populations. In addition, recovery from any limited change will be rapid following cessation of the development activities such as vessel movements. Therefore, overall the magnitude of effect from temporary habitat loss / disturbance during the construction stage within the export cable corridor is assessed as **very low** for all species, based on the spatially and temporally limited nature of this impact.

Significance of residual effect

12.9.2.12 With a predicted overall sensitivity of **medium** and a magnitude of impact of **very low**, the effect significance is therefore, **Minor Adverse** (**Not Significant**) in EIA terms.

12.9.3 Impact C2: direct temporary habitat loss / disturbance (offshore export cable corridor landfall)

Overview

12.9.3.1 The maximum assessment scenario relating to direct temporary habitat loss / disturbance at the export cable corridor landfall are presented in **Table 12.11**. Where predicted effects are identified, an assessment of the magnitude of change for each effect has been completed based on the methodology provided in **Section 12.8.2**. The magnitude of change, and hence the significance of potential effects has been assessed on the assumption that the embedded environmental measures from **Table 12.12** have been implemented as part of the Project. The Projects commitment to use HDD for cable installation (M-056, as shown in **Table 12.12**) will reduce the overall activity at the landfall and although occasional vehicles and workers may be present within the intertidal area this is not considered to cause a significant impact to any bird species utilising the intertidal area specifically gulls and waders.

12.9.3.2 This assessment is undertaken based on intertidal data collected at the two potential landfall sites (Scotstown and Lunderton), with an overview of intertidal species presented in **Table 12.10** and full details provided in **Volume 3, Appendix 12.1**. Scoped in receptors are those recorded in important numbers (>1% of the UK population and/or a nearby SPA population) at either landfall. These included:

- herring gull (Scotstown);
- sandwich tern (Scotstown and Lunderton);
- guillemot (Scotstown);
- shag (Scotstown and Lunderton); and
- eider (Lunderton).

12.9.3.3 For scoped in receptors, further details on behavioural sensitivity are provided below.

Evidence base for vulnerability to direct temporary habitat loss / displacement of intertidal receptors

12.9.3.4 Herring gull are considered to have low vulnerability to noise, lighting and visual disturbances that may be present during construction activity. Being opportunistic feeders, they are often attracted to people and urban areas, scavenging food in close proximity to pedestrians and vehicles in noise, and well-lit areas (Burnell *et al.,* 2023. They are also known to be attracted to vessels due to the potential of scavenging food from fishing vessels and so are not considered vulnerable to vessel presence.

12.9.3.5 Available evidence shows varied responses of Sandwich tern to anthropogenic disturbance. Disturbance responses at colonies are variable depending on habituation. For example, at the Farne Islands, Sandwich terns continue to incubate eggs when visitors are ~20m away, however at other colonies Sandwich terns are known to abandon nests due to anthropogenic disturbance at greater distances (Goodship and Furness, 2022). At sea, disturbance susceptibility is generally lower, with Sandwich terns showing minimal responses to vessel presence at sea (Perrow *et al*., 2011). However, vulnerability is considered to be high as a precautionary approach.

12.9.3.6 As outlined in **Section 12.9.2**, guillemot have moderate vulnerability to vessel presence, though responses are variable. Responses to other sources of anthropogenic disturbance, such as presence of people, show mixed responses though guillemots often show little response to the presence of people until within 50m proximity (Goodship and Furness, 2019).

12.9.3.7 Although evidence on shag vulnerability to anthropogenic disturbance is limited, Garthe and Hüppop (2004) classify the species as highly sensitive to ship and helicopter traffic, and Velando and Munilla (2011) observed avoidance behaviour in response to vessel presence. However, shags are frequently seen using man-made structures such as piers and harbour walls for loafing and wing-drying, often in areas with regular human activity. This suggests that local habituation may occur, potentially reducing their sensitivity to disturbance in some contexts. Disturbance vulnerability is therefore, considered to be medium.

12.9.3.8 Eider are considered to have medium to high vulnerability to anthropogenic disturbance. Available evidence suggests eiders are able to tolerate high levels of human disturbance; for example, in Scotland, females sitting on nests have been recorded allowing pedestrians within 1-2m before flushing (Goodship and Furness, 2022). However, evidence also suggests moderate vulnerability to vessels, with boat disturbance showing to both disturb birds and reduce foraging activity (Denhard *et al*., 2020; Merkel *et al*., (2009). Disturbance vulnerability is therefore, considered to be medium.

Sensitivity or value of receptor

12.9.3.9 As detailed within **Table 12.17**, the overall sensitivity of receptors scoped in for assessment of direct temporary habitat loss / disturbance at the offshore export cable corridor landfall varies from **medium** to **high**.

Magnitude of impact

12.9.3.10 Cable installation during the construction stage of the Project will be undertaken using HDD (or other trenchless techniques), which will involve drilling underground from an onshore HDD site compound to a point offshore, beyond the intertidal area. Therefore, these works will predominantly bypass the intertidal area, with minimal potential for disturbance to scoped in receptor species. The consequential length and depth of the HDD will depend on factors such as water depth, seabed topography, shallow geology / soil conditions and environmental constraints.

12.9.3.11 During works, there is expected to be increased vessel presence around the offshore exit points which has the potential to impact nearshore receptor species. Although the location of entry and exit points are not yet determined, activities associated with the offshore ducting for connection of the offshore cable to the landfall cable are spatially and temporally restricted. These activities, therefore, are not expected to cause any significant impacts to even the most sensitive species.

12.9.3.12 It has been assumed that 24-hour lighting would be required at the landfall(s) temporary construction compound during HDD operations. The landfall construction works duration will be up to one year for phase 1, up to one year for phase 2, and up to one year for phase 3. However, recovery from any resultant disturbance is likely to occur rapidly after the works are complete.

12.9.3.13 Although the seasonality of construction activities at the landfall(s) is not yet determined, receptor species will experience varying levels of impact depending on time of year. For example, works taking place during the non-breeding season will not impact Sandwich tern which are only present at the site during the summer months. However, in the absence of further information on the construction timescales, the assessment assumes construction activities taking place throughout the year.

12.9.3.14 The magnitude of the impact that construction activities relating to the Project will have on the intertidal receptor species is considered to be **very low**, indicating that the potential is for localised disturbance and / or temporary loss of habitat that does not threaten the long-term viability of the species.

Significance of residual effect

12.9.3.15 The Project embedded environmental measures (M-056, as shown in **Table 12.12**) include the use of HDD to avoid and minimise direct habitat loss / displacement to intertidal ornithological receptors impacts. It is predicted that the overall sensitivity of intertidal ornithological receptors is **medium** to **high**, and the magnitude is **very low** the effect significance is **Minor Adverse** (**Not Significant**) in EIA terms.

12.9.4 Impact C3: indirect impacts due to effects on prey species and habitats

Overview

12.9.4.1 The maximum design scenario relating to indirect impacts due to effects on prey species and habitats are presented in **Table 12.11**. Where predicted effects are identified, an assessment of the magnitude of change for each effect has been completed based on the methodology provided in **Section 12.8.2**. The magnitude of change, and hence the significance of potential effects has been assessed on the assumption that the embedded environmental measures (M-032) from **Table 12.12** have been implemented as part of the Project.

12.9.4.2 Following the outcome of the screening process presented in **Table 12.17** the receptors undergoing assessment for distributional responses due to Indirect impacts due to effects on prey species and habitats include:

- kittiwake;
- guillemot;
- razorbill; and
- puffin.

12.9.4.3 Indirect effects on offshore ornithology receptors may occur during the construction stage of the Project if there are impacts on prey species. As detailed within **Chapter 13: Fish Ecology** and **Chapter 10: Benthic, Epibenthic and Intertidal Ecology** the Project has the potential to impact seabird prey species via habitat loss and / or disturbance, generation of suspended sediments (for example, through installation of cables in the OAA and offshore export cable corridor, and through WTG anchoring), and associated underwater noise from construction activity.

12.9.4.4 These impact pathways may cause injury to or alter the behaviour of prey species. Underwater noise may cause fish and mobile invertebrates to avoid the construction area and also affect their physiology and behaviour. Suspended sediments may cause fish and mobile invertebrates to avoid the operation and maintenance area and may smother key life stages of sandeels / other key fish and hide immobile benthic prey. These mechanisms could potentially result in reduced prey availability of seabirds foraging within the Project and surrounding areas. Any form of indirect effect (including reductions in prey and habitat availability) may cause reduced survival or reproductive fitness of the species deemed at risk. The maximum impact on ornithological receptors will result from the maximum impact on fish and benthic receptors.

12.9.4.5 Key prey items for screened in ornithological receptors include Atlantic herring (*Clupea harengus*), European sprat (*Sprattus sprattus*) and common sandeel (*Ammodytes marinus*).

Sensitivity or value of receptor

12.9.4.6 As detailed within **Table 12.17,** the overall sensitivity of receptors scoped in for assessment of indirect impacts due to effects on prey species and habitats is **medium** for all receptors.

Magnitude of impact

12.9.4.7 Potential indirect impacts on prey species for ornithological receptors have been assessed in **Chapter 10: Benthic, Epibenthic and Intertidal Ecology** and **Chapter 13: Fish Ecology** and the conclusions of those assessments inform this assessment of indirect effects on ornithology receptors. Considering outcomes of these chapters, no significant effects on key prey receptors were concluded, with a maximum magnitude of impact of low on key prey species and their respective supporting habitats. The conclusion within such Chapters is that the indirect effect on fish and benthic habitats would be a magnitude of low at most for key prey species and their respective supporting habitats. Therefore, the magnitude of impact from indirect impacts due to effects on prey is assessed as **very low**.

Significance of residual effect

12.9.4.8 With a predicted overall sensitivity of **medium** and a magnitude of impact of **very low** the effect significance is therefore, **Minor Adverse** (**Not Significant**) in EIA terms.

12.10 Assessment of effects: Operation and maintenance stage

12.10.1 Introduction

12.10.1.1 This Section provides an assessment of the effects for offshore and intertidal ornithology from the operation and maintenance stage for the offshore elements of the Project.

12.10.1.2 The assessment methodology set out in **Section 12.8** has been applied to assess effects to offshore and intertidal ornithology from the Project.

12.10.2 Impact O1: indirect impacts due to effects on prey species and habitats

Overview

12.10.2.1 The maximum assessment scenario relating to Indirect impacts due to effects on prey species and habitats are presented in **Table 12.11**. Where predicted effects are identified, an assessment of the magnitude of change for each effect has been completed based on the methodology provided in **Section 12.8.2**. The magnitude of change, and hence the significance of potential effects has been assessed on the assumption that the embedded environmental measures from **Table 12.12** have been implemented as part of the Project.

12.10.2.2 Following the outcome of the screening process presented in **Table 12.17** the receptors undergoing assessment for distributional responses due to Indirect impacts due to effects on prey species and habitats include:

- kittiwake;

- guillemot;
- razorbill; and
- puffin.

12.10.2.3 Indirect effects on offshore ornithology receptors may occur during the operational stage of the Project (along with any required maintenance works) if there are impacts on prey species. As detailed within **Chapter 13: Fish Ecology** and **Chapter 10: Benthic, Epibenthic and Intertidal Ecology** the Project has the potential to impact seabird prey species via habitat loss and / or disturbance, generation of suspended sediments (for example, by the scouring effects of the catenary action of the mooring lines and around the foundations of the mooring anchors), the production of underwater noise as a result of vessel activity and operational turbines and changes in water quality.

12.10.2.4 These impact pathways may cause injury to or alter the behaviour of prey species. Underwater noise may cause fish and mobile invertebrates to avoid the Project area and also affect their physiology and behaviour. Suspended sediments may cause fish and mobile invertebrates to avoid the operation and maintenance area and may smother key life stages of sandeels / other key fish and hide immobile benthic prey. These mechanisms could potentially result in reduced prey availability of seabirds foraging within the Project and surrounding areas. Any form of indirect effect (including reductions in prey and habitat availability) may cause reduced survival or reproductive fitness of the species deemed at risk. The maximum impact on ornithological receptors will result from the maximum impact on fish and benthic receptors.

12.10.2.5 Key prey items for screened in ornithological receptors include Atlantic herring, European sprat and common sandeel.

Sensitivity or value of receptor

12.10.2.6 As detailed within **Table 12.17**, the overall sensitivity of receptors scoped in for assessment of indirect impacts due to effects on prey species and habitats is **medium** for all receptors.

Magnitude of impact

12.10.2.7 Potential indirect impacts on prey species for ornithological receptors have been assessed in **Chapter 10: Benthic, Epibenthic and Intertidal Ecology** and **Chapter 13: Fish Ecology** and the conclusions of those assessments inform this assessment of indirect effects on ornithology receptors. Considering outcomes of these chapters, no significant effects on key prey receptors were concluded, with a maximum magnitude of impact of low on key prey species and their respective supporting habitats. The conclusion within such Chapters is that the indirect effect on fish and benthic habitats would be a magnitude of low at most for key prey species and their respective supporting habitats. Therefore, the magnitude of impact from indirect impacts due to effects on prey is assessed as **very low**.

Significance of residual effect

12.10.2.8 With a predicted sensitivity of **medium** and a magnitude of impact of **very low** the effect significance is therefore, **Negligible Adverse** (**Not Significant**) in EIA terms.

12.10.3 Impact O2: distributional responses (Option Agreement Area)

Overview

12.10.3.1 The maximum assessment scenario relating to distributional response effects are presented in **Table 12.11**. Where predicted effects are identified, an assessment of the magnitude of change for each effect has been completed based on the methodology provided in **Section 12.8.2**. The magnitude of change, and hence the significance of potential effects has been assessed on the assumption that the embedded environmental measures from **Table 12.12** have been implemented as part of the Project.

12.10.3.2 The presence of WTGs has the potential to directly disturb and displace seabirds that would normally reside within and around the area of sea where the Project is proposed to be developed. This potentially reduces the area available to forage, loaf and / or moult. Such distributional responses to the presence of the Project may contribute to individual birds experiencing fitness consequences, which at an extreme level could lead to the mortality of individuals.

12.10.3.3 Seabirds vary in their response to the presence of anthropogenic structures such as offshore wind farms. Despite offshore wind farms being a relatively new feature within the marine environment, the potential distributional responses can be inferred from available post-consent monitoring from operational offshore wind farms.

12.10.3.4 To inform the recommended approach to assessment of distributional responses in Scottish waters, NatureScot has produced a guidance note (NatureScot, 2023f) providing advice on how to consider, assess and present information and potential consequences of seabird distributional responses to offshore wind farms. This guidance note has shaped the assessment provided below.

12.10.3.5 Following the outcome of the screening process presented in **Table 12.17**, the receptors undergoing assessment for distributional responses due to the presence of WTGs and other offshore infrastructure in the OAA include:

- kittiwake;
- guillemot;
- razorbill;
- puffin; and
- gannet

12.10.3.6 For the above species a quantitative assessment has been undertaken following the matrix approach only described within NatureScot Guidance Note 8 (NatureScot, 2023f). Although SeabORD could also be used to inform distributional response effects for kittiwake and auk species, due to the model currently undergoing updates it was agreed via consultation with NatureScot that such modelling was not required for the Project (**Table 12.1**). Further details on the matrix approach to assessment is provided within **Volume 3, Appendix 12.2**.

12.10.3.7 As noted within **Section 12.3**, at the request of NatureScot, fulmar has also been considered for assessment of distributional responses, though due to uncertainty regarding fulmars' behavioural response to such an effect, a qualitative assessment has been carried out only.

12.10.3.8 Additionally, consideration of barrier effects to migrating birds is also considered based on the requests made within **Section 12.3**.

12.10.3.9 For each of the six species screened in for assessment, a review was undertaken of evidence from the literature on potential disturbance levels and distributional response effects from offshore wind farms. These reviews have been used to inform the 'Developers' approach and the appropriateness of recommendations within NatureScot's Guidance Note 8 (NatureScot, 2023f), which has been used to inform the 'Guidance' approach to assessment.

Kittiwake

Kittiwake distributional responses evidence base

12.10.3.10 The current UK Statutory Nature Conservation Bodies (SNCBs) guidance on the requirements for displacement assessment (SNCBs, 2017, updated 2022), does not consider kittiwake to be a priority species as the species falls below the SNCBs recommended threshold for assessment relating to both 'disturbance susceptibility' and 'habitat specialisation'. The SNCB guidance also provides additional context as to why kittiwake (a gull species) were concluded as being below the threshold for disturbance and displacement susceptibility (SNCBs, 2022):

> *"It is recognised that, regardless of these scores, it is unlikely that cormorant and gull species will need to be routinely assessed for displacement, as a number of empirical studies have demonstrated these species can also be attracted as well as display no noticeable reaction to the presence of offshore wind farms (e.g. Leopold et al. 2013; Vanermen et al. 2015; Petersen et al. 2006; Mendel et al. 2014)".*

12.10.3.11 Reviews of displacement and disturbance studies by Furness *et al.* (2013), extended by Bradbury *et al.* (2014) and updated by Wade *et al.* (2016) allowed for the 'disturbance susceptibility' scores to be derived. Therefore, at the time of issue in 2017 the Joint SNCBs Interim Displacement Advice Note was based on the best available scientific evidence.

12.10.3.12 Dierschke *et al.* (2016) completed a comprehensive review on seabird avoidance and attraction to offshore wind farms based on behavioural responses of kittiwakes from 11 offshore wind farms. Mean scores were variable, with one account of strong attraction (increase of >80%), one account of weak attraction (increase of >50%), five accounts of no windfarm effect, one account of weak avoidance, one account of strong avoidance (decrease>80%) and two accounts of macro avoidance behaviour. The two accounts of macro avoidance at Horns Rev 1 and 2 were based on just 11 tracks (Skov *et al.,* 2012) and in previous studies on distributional responses at the two sites no significant effects where reported and kittiwake were observed roosting on the jacket foundations (Skov *et al.,* 2018).The account of strong avoidance was from studies at Thornton Bank which suggest a displacement rate of 70%, however at the neighbouring Bligh Bank site displacement was not observed for kittiwake (Vanermen *et al.,* 2016). Further uncertainty as to the distributional response being a wind farm effect is drawn from only one model showing a statistically significant effect, the buffer area showing a significant attraction effect and 1% of the kittiwakes recorded in the studies observed roosting on structures at Thorton Bank (Vanermen *et al.,* 2019). Therefore, the high distributional response reported by one statistical model may not be genuine nor can it be attributed with high confidence to the presence of the wind farm. The concluding remark from the authors was, '*due to inconsistency between the significance levels of the MMI and full model offshore wind farm coefficients, the results for black-legged kittiwake should yet be regarded as inconclusive*' (Vanermen *et al.,* 2019). The Dierschke review, classified kittiwake as a 'species which are hardly affected by offshore wind farms or with attraction and avoidance approximately equal over all studies'.

12.10.3.13 For all assessments in the UK, with the exception of Scotland, recommendations in the Joint SNCBs Displacement Advice Note (SNCBs, 2022) are followed and so kittiwakes have not been assessed for disturbance and displacement in EIAs. An exception to this was made for kittiwake displacement assessment for Mona and Morgan Offshore Wind Farms however this was made against the relevant representation recommendation; '*We do not consider this an accurate reflection of the EWG advice. Natural England and NRW advised that displacement was not assessed for kittiwake. Therefore, Natural England will not review or consider the findings of the displacement assessment for kittiwake'* (Morgan Offshore Wind Ltd, 2024).

12.10.3.14 The requirement for Scottish offshore wind farm projects to assess kittiwakes for distributional responses originated with the Seagreen Phase 1 offshore project application and the opinion provided by Scottish Ministers for the EIA Report (MD-LOT, 2017). Scottish Ministers stated that displacement assessments should be carried out for kittiwakes using a 30% displacement rate in the breeding season and for a qualitative assessment to be completed for the non-breeding season. NatureScot advised that '*There was no need to include kittiwake, the data available from post construction monitoring indicate no significant avoidance behaviour by this species*'. However, RSPB recommended a 50% displacement rate for kittiwake and so the Marine Directorate – Science Evidence, Data and Digital (MD-SEDD) advised that displacement should be included in kittiwake impact assessments as macro avoidance/ displacement has been observed at some wind farms and a 30% displacement rate was recommended (MD-LOT, 2017).

12.10.3.15 The advice provided to the Seagreen project regarding kittiwake displacement assessment was then taken through for Inch Cape, Neart na Gaoithe, Moray West and Pentland Floating Offshore Windfarm. The current ScotWind and INTOG round of east coast Scotland offshore wind applications (Green Volt, Berwick Bank, Salamander and Ossian) have all received the same Scoping Opinion for kittiwake displacement assessments. However, in all cases, the Applicant's position has been that the approach is highly precautionary considering the lack of empirical evidence supporting a 30% displacement rate (Green Volt, 2023; Berwick Bank, 2023, Salamander, 2024; Ossian, 2024, Cenos, 2024, Caledonia, 2024).

12.10.3.16 A series of published guidance notes were collated in January 2023 for NatureScot's advice on marine renewables development, which 'sets out NatureScot's recommendations for good practice in the impact assessments for Scottish casework'. Guidance Note 8 (NatureScot, 2023f) which relates to assessment of distributional response effects recommends a displacement rate of 30% for the impact assessments for kittiwake. This advice on kittiwake displacement is therefore no longer aligned with the advice given in the Joint SNCBs Interim Displacement Advice Note (2022). Although the guidance note refers to exceptions to advice in instances where strong empirical evidence suggests conclusions of the original sensitivity scores may be incorrect and that displacement rates may be updated when new evidence is available. The rationale for the proposed displacement rate used to inform the selection of the recommended displacement rate is unclear in Guidance Note 8. Therefore, any new studies that have been published since the issue of the Joint SNCBs Interim Displacement Advice Note (SNCBs, 2022) have been reviewed in the section below to determine whether new evidence is available to support the advised 30% rate for kittiwake displacement assessment.

12.10.3.17 Four studies on displacement effects on kittiwake have been completed since the Dierschke *et al.* (2016) review (APEM, 2017; Percival and Ford, 2017; Peschko *et al.,* 2020 and Trinder *et al.,* 2024) in addition to a series of tracking studies of kittiwakes from the east coast of Scotland (Pollock *et al.,* 2023; O'Hanlon *et al.,* 2024 and Johnston *et al.,* 2024) and an updated review on post-construction displacement and attraction of marine birds (Lamb *et al.,* 2024). Outcomes of these studies are as follows:

- Post-construction monitoring of the operational Westermost Rough Offshore Wind Farm found no evidence of avoidance from kittiwakes towards the offshore wind farm (APEM, 2017);

- Pre-, post- and construction stage monitoring of Westermost Rough Offshore Wind Farm found no statistically significant differences within the wind farm compared to pre-construction (Percival and Ford, 2017);
- Peschko *et al.* (2020) completed a study on kittiwake distributional responses at four offshore wind farms in the German North Sea. They described that distributional responses were statistically significant. However, there are concerns about the validity of the results and how genuine the displacement described is wind farm related.

12.10.3.18 Firstly, the reported effect in Peschko *et al.* (2020) is only detected from data that covers the second week of May to mid-July and referred to in the study as the ‘breeding season’. The analysis of the data that covered the period from late February to early May referred to in the study as the ‘Spring’, did not show any statistically significant displacement effects. The reasoning for this split in the data is unclear as the non-migratory breeding season for kittiwakes is usually defined as 01/05 to 31/07 and March and April are still considered the breeding season, as kittiwake attend the colony during this period establishing territories and building nests. Therefore, kittiwakes would be foraging from the colony in a similar manner as during May to July.

12.10.3.19 Secondly, none of the natural covariates had an effect on kittiwake densities in the breeding season. This would reduce the confidence of the predicted densities across the study area and whether apparent changes in densities between project phases are genuine. This is also reflected in the large CIs presented of -65% to -15% around the reported displacement effect of -45%. Indeed, the density distribution within the study area is not similar between the before and after project phases suggesting other factors are driving distributional changes other than the presence of the offshore wind farms in the ‘Spring’ period. Thirdly, survey effort was much higher within the offshore wind farm area and buffer areas than the wider study area used as a control although the study does not account for this. Fourthly, the displacement effect is from the combined response of all four offshore wind farms in the study and therefore it is unclear whether the distributional response applies equally at each offshore wind farm in the study. These concerns raise reasonable doubt as to whether the results are reproducible if the data underwent independent re-analysis.

- Post-construction monitoring of Beatrice Offshore Wind Farm in 2019 and 2021 breeding seasons indicated a significant redistribution of kittiwake with increases in parts of the wind farm for year 1 of monitoring (MacArthur Green, 2021 and 2023). However, in Year 2 there were no significant responses to distribution within the wind farm array (MacArthur Green, 2023). Overall, the peer-reviewed results describe no evidence of displacement by kittiwakes (Trinder *et al.,* 2024).

12.10.3.20 Tracking studies have also provided valuable information on kittiwake movements in proximity to offshore wind farms:

- Kittiwakes tagged at Buchan Ness to Collieston Coast SPA in the breeding season (late June to early August) indicated that 75% of tagged birds spent time within the OAA of the offshore wind farm, with up to 18% of flight time spent in the array (O’Hanlon *et al.,* 2024). A repetition of this study was completed in 2023 and found similar results (Johnston *et al.,* 2024); and
- Data from O’Hanlon *et al.* (2024) was also used in a study by Pollock *et al.* (2023), investigating behavioural responses of kittiwakes within foraging range of an offshore wind farm. As highlighted in the O’Hanlon *et al.* (2024) study, behaviours of kittiwakes are complex and variable responses were exhibited. In most cases there was attraction to the offshore wind farm sites, however this was not deemed as statistically significant.

12.10.3.21 The evidence above would suggest there is no strong empirical evidence to support the opinion that kittiwake is a species with significant susceptibility to distributional response effects and there is currently limited evidence of displacement effects in the literature reported for the non-breeding season. However, distributional responses impacts have been assessed as requested within NatureScot's Guidance Note 8 (NatureScot, 2023f) on a precautionary basis using the displacement and mortality rates recommended.

Sensitivity or value of receptor

12.10.3.22 As concluded within **Table 12.17**, the overall sensitivity of the receptor to distributional response effects is considered to be **low**.

Magnitude of impact

12.10.3.23 In light of the evidence presented above the Applicant considers there is insufficient evidence to justify a requirement to assess kittiwake for distributional response effects. Nevertheless, a Guidance approach is presented and assessed within **Table 12.19** , based on the recommendation of a 30% displacement rate and 1 to 3% mortality rate within NatureScot's Guidance Note 8 (NatureScot, 2023f).

12.10.3.24 A displacement matrix is presented within **Table 12.20** for the predicted annual mean peak abundance for kittiwake within the OAA plus 2km buffer. Seasonal displacement matrices are also provided within **Volume 3, Appendix 12.2**, alongside upper and lower confidence limit seasonal mean abundance estimates for additional context.

Table 12.19 Summary of kittiwake seasonal predicted distributional response impacts during the operation and maintenance stage for the Project alone

Season	Predicted Abundance (OAA plus 2km)	Regional baseline populations (individuals)	Predicted Impact	
			30% Displacement; 1 to 3% mort (individuals per annum)	Reduction in survival rate (%)
Breeding	890	283,312	2.67 to 8.01	0.001 to <0.003
Non-breeding	144	829,937	0.43 to 1.30	<0.001
Annual	1,034	829,937	3.10 to 9.31	<0.001 to 0.001

12.10.3.25 As summarised in **Table 12.19**, the level of impact predicted annually or seasonally does not exceed a 0.02% change in the regional baseline population survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore the magnitude of the impact is assessed as **very low**.

Significance of residual effect

12.10.3.26 With a predicted sensitivity of **low** and a magnitude of impact of **very low**, the effect significance is therefore, **Negligible Adverse** (**Not Significant**) in EIA terms.

Table 12.20 Kittiwake annual displacement matrix based on an abundance of 1,034 individuals for the OAA plus 2km buffer

Displacement (%)	Mortality rates (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	1	1	2	3	4	5	6	7	8	9	10
10	0	1	2	3	4	5	10	21	31	41	52	62	72	83	93	103
20	0	2	4	6	8	10	21	41	62	83	103	124	145	165	186	207
30	0	3	6	9	12	16	31	62	93	124	155	186	217	248	279	310
40	0	4	8	12	17	21	41	83	124	165	207	248	290	331	372	414
50	0	5	10	16	21	26	52	103	155	207	259	310	362	414	465	517
60	0	6	12	19	25	31	62	124	186	248	310	372	434	496	558	620
70	0	7	14	22	29	36	72	145	217	290	362	434	507	579	651	724
80	0	8	17	25	33	41	83	165	248	331	414	496	579	662	744	827
90	0	9	19	28	37	47	93	186	279	372	465	558	651	744	838	931
100	0	10	21	31	41	52	103	207	310	414	517	620	724	827	931	1,034

Auk species distributional responses evidence base

12.10.3.27 Displacement impacts from offshore wind farm post-consent monitoring studies were first reviewed by Dierschke *et al.* (2016). The review concluded that the most common response, to the presence of turbines, for auks was 'weak displacement' but with a few exceptions such as for the Dutch and Belgium offshore wind farms which suggested displacement rates of 60-75%. However, auk abundance within these studies tends to be low and re-analyses of the data using INLA suggested displacement effects could be lower than 50% or shown to be not statistically significant (Zuur, 2018; Vanermen *et al.,* 2019). There have been further displacement studies on auks (APEM, 2017; Webb *et al.,* 2017; Vanermen *et al.,* 2019; Peschko *et al.,* 2020; MacArthur Green, 2021) which have been summarised as part of a more recent comprehensive review on auk displacement responses to offshore wind farms (APEM, 2022a).

12.10.3.28 APEM (2022a) provides an extensive analysis of empirical data from multiple offshore wind farms expanding and updating the review by Dierschke *et al.* (2016). The review concluded that auk displacement varied considerably between study sites showing attraction, no significant effect, or a displacement effect. For example, the studies on guillemot included: one offshore wind farm with positive displacement effects, eight offshore wind farms with no significant effects or weak displacement effects, three with inferred displacement effects (but not statistically tested), and eight with negative displacement effects. The displacement effects from those studies which provided a defined displacement rate ranged from +112% to -75%. The number of studies on razorbill are considerably fewer but show a similar range of displacement responses from three studies suggesting no significant effects and three studies indicating a displacement rate which range from 30% to 80%. For puffin there has been little empirical study of displacement rates for offshore wind farms. In the review by Dierschke *et al.* (2016) a response class for displacement was not allocated to this species due to lack of data. However, disturbance susceptibility for puffin has been estimated to be less than guillemot and razorbill (Bradbury *et al.,* 2014) therefore in the absence of species-specific displacement rates for puffin, rates used for guillemot and razorbill would be reasonable. Although displacement rates of 50% or more were concluded for some of these studies these were only observed in the non-breeding season. Review of the analysis methods and quality of the datasets for these studies, found that some studies have not utilised the most appropriate statistical modelling methods for the data collected. These studies were coincidentally found to have high displacement rates due to low abundance and high numbers of zero counts, making displacement rate prediction highly problematic given natural spatial and temporal variation in auk abundance and distribution. As such, the displacement effects reported in these studies are most likely over precautionary. The conclusion from the APEM (2022a) literature review suggested that a displacement rate of up to 50% for the OAA and 2km buffer would be the most evidence-based approach for UK offshore wind farms, whilst still being suitably precautionary for assessment. Lamb *et al.* (2024) conducted a meta-analysis to assess the likelihood of detecting a response from seabirds to offshore wind farms. The analysis concluded that the presence and rate of distributional change reported in studies were dependent on study design criteria and wind farm characteristics, suggesting displacement rates are likely to be site-specific.

12.10.3.29 Further evidence that an auk displacement rate of 50% is precautionary comes from studies that indicate auk habituation to offshore wind farms. This was recently demonstrated at Thanet Offshore Wind Farm, where auk displacement was shown to be statistically significant, but only in the short term, with abundances increasing within the wind farm from year two post-construction suggesting some level of habituation after one year of operation. Indeed, year two and three displacement rates for auks fell from a range of 75% to 85% in the first year of operation to a low of 31% to 41% within year two and three of operations (Royal HaskoningDHV, 2013). There is also further emerging evidence as additional post-construction monitoring of offshore wind farms continues, with reports of auk numbers increasing and observations of foraging behaviour within the wind farm itself (Leopold and Verdaat, 2018). This includes evidence of habituation within offshore wind farms of the Belgium wind farm concession zone which previously concluded displacement rates of over 70% now reporting higher numbers within the wind farm than outside (Degraer *et al.,* 2021). This would suggest that displacement rates are expected to diminish over the operational life of offshore wind farms.

12.10.3.30 The most recent evidence in relation to auk behavioural responses to offshore wind farms in the UK comes from the post-construction monitoring of Beatrice Offshore Wind Farm, which indicated higher abundances of guillemot and razorbill within the Beatrice Offshore Wind Farm compared to pre-construction surveys (MacArthur Green, 2021). Specifically, results indicated that there were significant increases in overall auk abundance post-construction. Results from the second year of post-construction monitoring suggested no indication of avoidance of the offshore wind farm or individual turbines and in some cases higher densities of auks were recorded in proximity to turbines (MacArthur Green, 2023). Overall, it was concluded that no displacement effects on auks were detected from the two years of post-consent monitoring for the Beatrice Offshore Wind Farm (Trinder *et al.,* 2024).

12.10.3.31 The only studies that demonstrate significant and robust displacement effects are reported for offshore wind farms in the German North Sea. Peschko *et al.* (2020), reported displacement effects of 44% in the breeding season although with a 95% CI of 8 to 66% suggesting considerable uncertainty. Later studies on displacement effects during the non-breeding season reported that only during the post breeding migration did displacement within the offshore wind farm and response radius reach 79%. For the winter period the displacement effect was reported at 51% within the offshore wind farm and response radius (Peschko *et al.,* 2024). However, as Lamb *et al.* (2024) concluded, reported displacement responses are likely to be site specific especially between different wind farm designs and distant geographical locations.

12.10.3.32 Therefore, in conclusion, there is strong evidence to support the Developer approach auk displacement rate of 50% within offshore wind farm sites and out to a 2km buffer. This would be considered precautionary as displacement effects of 50% or higher have not been concluded in the breeding season in any study and significant displacement effects of 70% or higher have only been concluded during autumn passage and only within one study area outside UK waters that see large numbers of guillemot pass through this area (Peschko *et al.,* 2024). This does not align with the Guidance approach that suggests the use of up to 60% displacement for all seasons (NatureScot, 2023f). Both approaches are provided in the impact assessments for all three auk species.

12.10.3.33 In relation to mortality rates, current evidence suggests that the response of seabirds to offshore wind farms varies depending on the species and life stage of the individual birds. The levels both spatially and temporally to which birds may avoid offshore wind farms are likely to be based on key factors such as competition levels within the wider area and prey abundance within the offshore wind farm. The consequence of such avoidance may result in reduced foraging areas available to individuals. Mortalities are likely to correlate strongly with the quality of the area within the offshore wind farm that some individuals are displaced from but conversely may offer increased foraging efficiency for those still entering the offshore wind farm area. If the offshore wind farm area is considered to be a key foraging area and the area outside of the offshore wind farm is close to carrying capacity, then higher mortality rates may theoretically occur (Busche and Garthe, 2016; SNCBs, 2022). Conversely, if birds are being displaced into an area of optimal habitat and closer to breeding colonies, then this could result in a positive impact due to species having a reduction in energy expenditure foraging (Searle *et al.,* 2020).

12.10.3.34 For auk species, NatureScot's Guidance Note 8 (NatureScot, 2023f) recommends a mortality rate of 3 to 5% during the breeding season and 1 to 3% during the non-breeding season. The appropriateness of using mortality rates as high as 5% is unclear given the limited evidence. There have been two detailed studies that modelled the predicted consequence of displaced seabirds using individual based models (IBMs), including auks, from offshore wind farms (Searle *et al.,* 2014 and 2018; and van Kooten *et al.,* 2019). IBMs incorporate biological parameters such as wind farm location in relation to relevant seabird colonies, seabird utilisation density maps energetic requirements and prey distributions to model a more evidence-based fate of displaced birds.

12.10.3.35 Van Kooten *et al.* (2019) determined the cost of birds avoiding areas based on energy-budget models for two scenarios; using habitat utilisation maps and a fixed 10% mortality rate. The results demonstrated that an additional 1% mortality for displaced auks is a more appropriate evidenced-based rate, in comparison to the overly precautionary 10% mortality rate.

12.10.3.36 Searle *et al.* (2014; 2018) assessed the effects that displacement and barrier effects have on breeding seabirds. The study was based on time and energy budget models being created to estimate the displacement impacts on the breeding population of seabirds, including auks during the chick rearing period. The models provided evidence that displacement has the potential to impact on future survival prospects of an auk due to changes in time and energy budgets. The model simulations consistently yielded estimated offshore wind farm project alone effects that corresponded to additional declines in SPA adult survival of less than 1% for auks.

12.10.3.37 A key factor determining the effects of displacement is the importance of the OAA (such as prey abundance) in the context of the surrounding area. Initial reviews of potential offshore wind energy zones were developed by the Scottish Government through the Sectoral Marine Plan (Scottish Government, 2020b), which looked to lease new areas for development through a scheme known as Scotwind. This included Draft Plan Options published in early 2019, which considered the environmental, social and economic information to identify areas best suited for further offshore wind farm development in Scottish waters as well as a plan-level Strategic Environmental Assessment and Habitats Regulations Assessment to consider offshore wind farm development within these areas. Therefore, through the Scottish Government's Scotwind scheme site selection process avoided areas of known with high density usage by seabirds and so reducing impacts from potential displacement. Following this a broad assumption can be made that areas of higher prey availability are available within foraging distance outside the OAA for displaced any birds. Based on the best available evidence from the IBM simulation studies, it is suggested that mortality rates for displaced birds are considerably less than 5%. Indeed, Searle *et al.* (2020) demonstrated that modelled estimates of additional mortality at SPAs to combined offshore wind farm footprint displacement can be lower than 1%.

12.10.3.38 Further anecdotal evidence of negligible additional mortality rates as a consequence of displacement comes from the post consent monitoring of the Helgoland auk colony in the German North Sea. Offshore wind farms have been in operation in the area since 2014 and a displacement rate for auks was reported of 44 and 63% in the breeding season and spring periods, respectively (Peschko *et al.,* 2020). The offshore wind farms have therefore, been in operation long enough for any correlations between colony demographics and operation of the offshore wind farm to be identified. The latest breeding population status on Helgoland shows a continued increase for both razorbill and guillemot over the latest five-year period, which has remained unchanged compared to long-term data (Gerlach *et al.,* 2019), supporting an inferred conclusion that high mortality rates due to displacement are not occurring at the colony.

12.10.3.39 Therefore, a matrix approach using a broad range of mortality rates can be refined using estimations based on available evidence from IBM studies (Van Kooten *et al.,* 2019; Searle *et al.,* 2014; 2018; 2023), which suggest additional mortality rates for displaced seabirds are unlikely to exceed 1% for SPA birds especially at the limit of their foraging range. Therefore, based on best available evidence from IBM studies and given that the ScotWind site selection process (Scottish Government, 2020b) included studies to avoid areas preferred and utilised by seabirds the Developer approach considers a mortality rate of up to 1% to be sufficiently precautionary for assessment of consequential displacement mortality. This is different to the approach recommended within NatureScot's Guidance Note 8 (NatureScot, 2023) that recommends the use of up to a 5% mortality rate. Both approaches will be provided in the impact assessments for all three auk species.

Guillemot

Sensitivity or value of receptor

12.10.3.40 As concluded within **Table 12.17** the overall sensitivity of the receptor to distributional response effects is considered to be **medium**.

Magnitude of impact

12.10.3.41 The level of predicted impact in relation to distributional responses during the operation and maintenance stage is provided in **Table 12.21** and **Table 12.22**. The impact predictions presented in **Table 12.21** are based on the Developer approach, whilst impact predictions in **Table 12.22** are based on displacement and mortality rates recommended within NatureScot's Guidance Note 8 (NatureScot, 2023f) forming the Guidance approach.

12.10.3.42 A displacement matrix is presented within **Table 12.24** for the predicted annual mean peak abundance for guillemot within the OAA plus 2km buffer. Seasonal displacement matrices are also provided within **Volume 3, Appendix 12.2**, alongside upper and lower confidence limit seasonal mean abundance estimates for additional context.

Table 12.21 Summary of guillemot seasonal predicted distributional response impacts during the operation and maintenance stage for the Project alone following the Developer approach

Season	Predicted Abundance (OAA plus 2km)	Regional baseline populations (individuals)	Predicted Impact	
			50% Displacement; 0 to 1% mort (individuals per annum)	Reduction in survival rate (%)
Breeding	16,989	189,381	0.00 to 84.95	0.00 to 0.045
Non-breeding	5,237	189,381	0.00 to 26.19	0.00 to 0.014
Annual	22,226	189,381	0.00 to 111.13	0.00 to 0.059

Table 12.22 Summary of guillemot seasonal predicted distributional response impacts during the operation and maintenance stage for the Project alone following the Guidance approach

Season	Predicted Abundance (OAA plus 2km)	Regional baseline populations (individuals)	Predicted Impact	
			60% Displacement; 1-5% mort* (individuals per annum)	Reduction in survival rate (%)
Breeding	16,989	189,381	305.80 to 509.67	0.161 to 0.269
Non-breeding	5,237	189,381	31.42 to 94.27	0.017 to 0.050
Annual	22,226	189,381	337.22 to 603.94	0.178 to 0.319

Table Note: *A mortality rate of 3 to 5% has been applied during the breeding season and a mortality rate of 1 to 3% has been applied during the non-breeding season in accordance with NatureScot's Guidance Note 8 (NatureScot, 2023f).

12.10.3.43 As concluded within **Table 12.21** and **Table 12.22**, the level of impact predicted annually or seasonally exceeds the 0.02% change in the regional baseline population survival rate when considering both the Developer approach and the Guidance approach. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g), further consideration of the potential impact is required in the form of PVA.

12.10.3.44 PVA has been undertaken for the 35-year operational lifetime of the Project and modelled using the regional baseline population 189,381 individuals. Outputs are presented in **Table 12.23** below, including the predicted median reduction in counterfactual annual growth rate (CGR) and median reduction in the counterfactual final population size (CPS). PVA modelling was undertaken using density independent modelling and therefore, the CGR value is considered a more reliable metric than CPS values for interpreting impacts (Cook and Robinson, 2016). For full details on PVA methodology, see **Volume 3, Appendix 12.4**.

Table 12.23 PVA results for predicted distributional response impacts on guillemot for the Project alone

Scenario modelled	Annual increase in mortality (individuals)	Density independent counterfactual metric (35yrs)			
		Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35yrs (%)
50% Displacement, 1% mortality	111.13	0.999	0.07	0.976	2.36
60% displacement, 3% mortality (breeding, 1% mortality (non-breeding)	337.22	0.998	0.20	0.930	6.96

Scenario modelled	Annual increase in mortality (individuals)	Density independent counterfactual metric (35yrs)			
		Median CGR	Reduction in annual growth rate (%)	Median CPS	Reduction in final population size after 35yrs (%)
60% displacement, 5% mortality (breeding, 3% mortality (non-breeding)	603.94	0.996	0.36	0.879	12.14

12.10.3.45 The Scottish breeding guillemot population has declined by 31% between the Seabirds 2000 Census, and Seabirds Count (2015-21) (Burnell *et al*., 2023), though notably the largest declines were observed in the north in Orkney and Shetland, which do not form part of the regional population assessed against for guillemot. Key Special Protection Areas (SPAs) forming the regional population for guillemot include the Buchan Ness to Collieston Coast SPA (which declined by 0.0% per annum across this period), and the Troup, Pennan and Lion's Head SPA (which declined by 4.3% per annum). The cause for these declines observed in Scotland is thought to be linked to reductions in prey availability during the breeding season resulting in reduced productivity or starvation in winter months (Burnell *et al.,* 2023). However, remedial actions have been taken to reduce the risk of reduced prey availability impacting guillemot via The Sandeel (Prohibition of Fishing) (Scotland) Order 2024.

12.10.3.46 A review of pre and post HPAI outbreak colony trends was conducted by Tremlett *et al.* (2024) for various seabird species. Guillemot individuals were shown to have decreased by 6% when comparing pre-HPAI records to counts conducted in 2023 post the outbreak. It must be noted that colony specific trends do differ in terms of colony count change. A further, less significant outbreak of HPAI occurred at seabird colonies in 2023, although the virus was not noted to affect guillemots until June, July and August, after colony counts were completed, suggesting impacts may be worse that reported in Tremlett *et al.* (2024).

12.10.3.47 When considering the Developer approach, a reduction in growth rate of up to 0.07% per annum (**Table 12.23**), would be indistinguishable from natural fluctuations in the population.

12.10.3.48 Under the Guidance approach, the predicted impact could result in up to a 0.36% reduction in population growth rate annually, which if true may lead to an adverse impact on the regional population when considering the Scottish guillemot population trend. However, this predicted impact is considered to be highly precautionary for the following reasons:

- Peak abundance assumption. Mean peak abundance estimates assume that the highest monthly abundance represents the entire season, likely overestimating exposure. This precautionary assumption is applied consistently across all projects in the cumulative assessment.
- High displacement and mortality rates. The approach assumes displacement of 60% and mortality of 3%/5% for all projects, despite limited evidence supporting these values.
- No habituation considered. The assessment does not account for potential habituation or adaptation of birds over the operational lifetime of the project.
- No density dependence or environmental covariates are considered within PVA. Modelling assumes a closed population and excludes compensatory mechanisms such

as reduced competition for resources when numbers decline. If density dependence were incorporated, the predicted reduction in annual growth rate would likely be smaller, further reducing the estimated impact. Additionally, PVA does not consider other environmental factors likely to have a significantly greater effect on the receptor and likely overshadow any potential effects from developments. Such environmental factors would include reduction in prey availability linked to changes in environmental conditions (climate change).

12.10.3.49 Despite the above points, when considering the outputs from the Developer approach, the predicted cumulative impact is assessed as **low** at most. For the Guidance approach, a magnitude of **low** to **medium** is concluded.

Significance of residual effect

12.10.3.50 With a predicted sensitivity of **medium** and a magnitude of impact of up to **medium**, the effect significance is therefore, **Moderate Adverse** (**Significant**) in EIA terms.

12.10.3.51 As the effect significance has been concluded as significant in EIA terms, the Project has considered the feasibility of mitigation to reduce the residual effect significance. However, there are no feasible mitigation measures that sufficiently reduce the potential for adverse effect to an acceptable level, without compromising the feasibility of the Project (please refer to the **Derogation Case**).

12.10.3.52 To note, the Project has provided potential options for compensation with respect to guillemot, as presented within the Derogation Case. Although such compensation options are focussed on offsetting the predicted impacts apportioned to selected qualifying features of designated sites, such potential measures if implemented are expected to significantly offset the Project’s contribution to regional scale impacts.

Table 12.24 Guillemot annual displacement matrix based on an abundance of 22,226 individuals for the OAA plus 2km buffer

Displacement (%)	Mortality rates (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	2	4	7	9	11	22	44	67	89	111	133	156	178	200	222
10	0	22	44	67	89	111	222	445	667	889	1,111	1,334	1,556	1,778	2,000	2,223
20	0	44	89	133	178	222	445	889	1,334	1,778	2,223	2,667	3,112	3,556	4,001	4,445
30	0	67	133	200	267	333	667	1,334	2,000	2,667	3,334	4,001	4,667	5,334	6,001	6,668
40	0	89	178	267	356	445	889	1,778	2,667	3,556	4,445	5,334	6,223	7,112	8,001	8,890
50	0	111	222	333	445	556	1,111	2,223	3,334	4,445	5,556	6,668	7,779	8,890	10,001	11,113
60	0	133	267	400	533	667	1,334	2,667	4,001	5,334	6,668	8,001	9,335	10,668	12,002	13,335
70	0	156	311	467	622	778	1,556	3,112	4,667	6,223	7,779	9,335	10,890	12,446	14,002	15,558
80	0	178	356	533	711	889	1,778	3,556	5,334	7,112	8,890	10,668	12,446	14,224	16,002	17,780
90	0	200	400	600	800	1,000	2,000	4,001	6,001	8,001	10,001	12,002	14,002	16,002	18,003	20,003
100	0	222	445	667	889	1,111	2,223	4,445	6,668	8,890	11,113	13,335	15,558	17,780	20,003	22,226

Razorbill

Sensitivity or value of receptor

12.10.3.53 As concluded within **Table 12.17**, the overall sensitivity of the receptor to distributional response effects is considered to be **medium**.

Magnitude of impact

12.10.3.54 The level of predicted impact in relation to distributional responses during the operation and maintenance stage is provided in **Table 12.25** and **Table 12.26**. The impact predictions presented in **Table 12.25** are based on the Developer approach, whilst impact predictions in **Table 12.26** are based on displacement and mortality rates recommended within NatureScot's Guidance Note 8 (NatureScot, 2023f) forming the Guidance approach.

12.10.3.55 A displacement matrix is presented within **Table 12.27** for the predicted annual mean peak abundance for razorbill within the OAA plus 2km buffer. Seasonal displacement matrices are also provided within **Volume 3, Appendix 12.2**, alongside upper and lower confidence limit seasonal mean abundance estimates for additional context.

Table 12.25 Summary of razorbill seasonal predicted distributional response impacts during the operation and maintenance stage for the Project alone following the Developer approach

Season	Predicted Abundance (OAA plus 2km)	Regional baseline populations (individuals)	Predicted Impact	
			50% Displacement; 0 to 1% mort (individuals per annum)	Reduction in survival rate (%)
Breeding	356	30,895	0.00 to 1.78	0.000 to 0.006
Non-breeding	1,214	591,874	0.00 to 6.07	0.000 to 0.001
Annual	1,570	591,874	0.00 to 7.85	0.000 to 0.001

Table 12.26 Summary of razorbill seasonal predicted distributional response impacts during the operation and maintenance stage for the Project alone following the Guidance approach

Season	Predicted Abundance (OAA plus 2km)	Regional baseline populations (individuals)	Predicted Impact	
			60% Disp; 1 to 5% mort* (individuals per annum)	Reduction in survival rate (%)
Breeding	356	30,895	6.41 to 10.68	0.021 to 0.035
Non-breeding	1,214	591,874	7.28 to 21.85	0.001 to 0.004
Annual	1,570	591,874	13.69 to 32.53	0.002 to 0.005

Table Note: *A mortality rate of 3-5% has been applied during the breeding season and a mortality rate of 1-3% has been applied during the non-breeding season in accordance with NatureScot's Guidance Note 8 (NatureScot, 2023f).

12.10.3.56 When considering either the Developer approach presented within **Table 12.25** or the Guidance approach presented in **Table 12.26**, the level of impact predicted annually or seasonally does not exceed a 0.02% change in the regional baseline population survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore the magnitude of the impact is assessed as **low**.

Significance of residual effect

12.10.3.57 With a predicted sensitivity of **medium** and a magnitude of impact of **low** the effect significance is therefore, **Minor Adverse** (**Not Significant**) in EIA terms.

Table 12.27 Razorbill annual displacement matrix based on an abundance of 1,570 individuals for the OAA plus 2km buffer

Displacement (%)	Mortality rates (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	1	1	2	3	5	6	8	9	11	13	14	16
10	0	2	3	5	6	8	16	31	47	63	79	94	110	126	141	157
20	0	3	6	9	13	16	31	63	94	126	157	188	220	251	283	314
30	0	5	9	14	19	24	47	94	141	188	236	283	330	377	424	471
40	0	6	13	19	25	31	63	126	188	251	314	377	440	502	565	628
50	0	8	16	24	31	39	79	157	236	314	393	471	550	628	707	785
60	0	9	19	28	38	47	94	188	283	377	471	565	659	754	848	942
70	0	11	22	33	44	55	110	220	330	440	550	659	769	879	989	1,099
80	0	13	25	38	50	63	126	251	377	502	628	754	879	1,005	1,130	1,256
90	0	14	28	42	57	71	141	283	424	565	707	848	989	1,130	1,272	1,413
100	0	16	31	47	63	79	157	314	471	628	785	942	1,099	1,256	1,413	1,570

Puffin

Sensitivity or value of receptor

12.10.3.58 As concluded within **Table 12.17**, the overall sensitivity of the receptor to distributional response effects is considered to be **medium**.

Magnitude of impact

12.10.3.59 The level of predicted impact in relation to distributional responses during the operation and maintenance stage is provided in **Table 12.28** and **Table 12.29**. The impact predictions presented in **Table 12.28** are based on the Developer approach, whilst impact predictions in **Table 12.29** are based on displacement and mortality rates recommended within NatureScot's Guidance Note 8 (NatureScot, 2023f) forming the Guidance approach.

12.10.3.60 A displacement matrix is presented within **Table 12.30** for the predicted annual mean peak abundance for puffin within the OAA plus 2km buffer. Seasonal displacement matrices are also provided within **Volume 3, Appendix 12.2**, alongside upper and lower confidence limit seasonal mean abundance estimates for additional context.

Table 12.28 Summary of puffin seasonal predicted distributional response impacts during the operation and maintenance stage for the Project alone following the Developer approach

Season	Predicted Abundance (OAA plus 2km)	Regional baseline populations (individuals)	Predicted Impact	
			50% Displacement; 0 to 1% mort (individuals per annum)	Reduction in survival rate (%)
Breeding	554	248,313	0.00 to 2.77	0.000 to 0.001
Non-breeding	50	231,957	0.00 to 0.25	<0.001
Annual	604	248,313	0.00 to 3.02	0.000 to 0.001

Table 12.29 Summary of puffin seasonal predicted distributional response impacts during the operation and maintenance stage for the Project alone following the Guidance approach

Season	Predicted Abundance (OAA plus 2km)	Regional baseline populations (individuals)	Predicted Impact	
			60% Disp; 1 to 5% mort* (individuals per annum)	Reduction in survival rate (%)
Breeding	554	248,313	9.97 to 16.62	0.004 to 0.007
Non-breeding	50	231,957	0.30 to 0.90	<0.001
Annual	604	248,313	10.27 to 17.52	0.004 to 0.007

Table Note: *A mortality rate of 3 to 5% has been applied during the breeding season and a mortality rate of 1 to 3% has been applied during the non-breeding season in accordance with NatureScot's Guidance Note 8 (NatureScot, 2023f).

12.10.3.61 As concluded within **Table 12.28** and **Table 12.29**, regardless of the approach taken the level of impact predicted annually or seasonally does not exceed a 0.02% change in the regional baseline population survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore the magnitude of the impact is assessed as **very low.**

Significance of residual effect

12.10.3.62 With a predicted overall sensitivity of **medium** and a magnitude of impact of **very low**, the effect significance is therefore, **Minor Adverse** (**Not Significant**) in EIA terms.

Table 12.30 Puffin annual displacement matrix based on an abundance of 604 individuals for the OAA plus 2km buffer

Displacement (%)	Mortality rates (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	1	1	2	2	3	4	4	5	5	6
10	0	1	1	2	2	3	6	12	18	24	30	36	42	48	54	60
20	0	1	2	4	5	6	12	24	36	48	60	72	85	97	109	121
30	0	2	4	5	7	9	18	36	54	72	91	109	127	145	163	181
40	0	2	5	7	10	12	24	48	72	97	121	145	169	193	217	242
50	0	3	6	9	12	15	30	60	91	121	151	181	211	242	272	302
60	0	4	7	11	14	18	36	72	109	145	181	217	254	290	326	362
70	0	4	8	13	17	21	42	85	127	169	211	254	296	338	381	423
80	0	5	10	14	19	24	48	97	145	193	242	290	338	387	435	483
90	0	5	11	16	22	27	54	109	163	217	272	326	381	435	489	544
100	0	6	12	18	24	30	60	121	181	242	302	362	423	483	544	604

Gannet

Gannet distributional responses evidence base

12.10.3.63 Gannets show a low level of sensitivity to ship and helicopter traffic (Garthe and Hüppop, 2004; Furness and Wade, 2012). A study by Krijgsveld *et al*. (2011) using radar and visual observations to monitor the post-construction effects of the Egmond aan Zee (OWEZ) Offshore Wind Farm established that 64% of gannets avoided entering the wind farm (macro-avoidance). The results of the post-consent monitoring surveys for Thanet Offshore Wind Farm found that gannet densities reduced within the site in the third year, but the report did not quantify this (Royal HaskoningDHV, 2013). Evidence from a recent review undertaken by APEM (2022b), which has collated and critically appraised studies from 25 offshore wind farms, suggests that gannet behavioural response to offshore wind farms varies seasonally with data suggesting displacement rates of 40% to 60% during the breeding season and 60% to 80% during the non-breeding season.

12.10.3.64 More recent studies in relation to gannet responses to offshore wind farms comes from the Beatrice Offshore Wind Farm post-construction monitoring data, which suggested displacement rates, although not quantified directly, in the upper range described above for the breeding season (MacArthur Green, 2021 and 2023), as only 12 gannets were recorded within the offshore wind farm during 2021.

12.10.3.65 Therefore, for the purpose of this assessment, the Developer approach utilises a displacement rate of 60% to 80%, to account for the potential variability noted above. This is presented alongside the Guidance approach which recommends using a 70% displacement rate (NatureScot, 2023f).

12.10.3.66 NatureScot's guidance is to present and consider assessing displacement impacts using a mortality rate of up to 3% (NatureScot, 2023f); the appropriateness of using mortality rates as high as 3% is unclear given the lack of evidence. A mortality rate of 1% was selected for the Developer preferred approach, based on expert judgement supported by the evidence that suggests that gannet have a large mean max (315km) and maximum (709km) foraging range during the breeding season (Woodward *et al*., 2019) and during the non-breeding season can travel 200km to 400km per day (Garthe *et al.,* 2007). Gannet can switch to different prey depending on availability, feeding on a variety of different prey items including mackerel (*Scomber scombrus*), sandeels (*Ammodytes sp*.), immature herring (*Clupea harrengus*) and sprat (*Sprattus sprattus*) (Forrester *et al.,* 2007; Hamer *et al.,* 2007), which provide sufficient alternative foraging opportunities despite any potential reduced foraging within the OAA. Therefore, despite the likely displacement responses by gannets to offshore wind farms, it is highlighted that any potential consequences of displacement would likely be minimal due to their large foraging range, their diverse diet and the low energy costs associated with the additional flight distances incurred.

12.10.3.67 For the purpose of this assessment, the Developer approach is focussed on a displacement rate of 60% to 80% and mortality rate of 1% for each season based on evaluation of the preceding evidence. Additional consideration is provided by reference to the Guidance approach assessing potential impacts using 70% displacement rate and a mortality rate of 1 to 3% (NatureScot, 2023f).

Sensitivity or value of receptor

12.10.3.68 As concluded within **Table 12.17,** the overall sensitivity of the receptor to distributional response effects is considered to be **medium**.

Magnitude of impact

12.10.3.69 The level of predicted impact in relation to distributional responses during the operation and maintenance stage is provided in **Table 12.31** and **Table 12.32**. The impact predictions presented in **Table 12.31** are based on the Developer preferred approach, whilst impact predictions in **Table 12.32** are based on displacement and mortality rates recommended within NatureScot's Guidance Note 8 (NatureScot, 2023f) forming the Guidance approach.

12.10.3.70 A displacement matrix is presented within **Table 12.33** for the predicted annual mean peak abundance for gannet within the OAA plus 2km buffer. Seasonal displacement matrices are also provided within **Volume 3, Appendix 12.2**, alongside upper and lower confidence limit seasonal mean abundance estimates for additional context.

Table 12.31 Summary of gannet seasonal predicted distributional response impacts during the operation and maintenance stage for the Project alone following the Developer approach

Season	Predicted Abundance (OAA plus 2km)	Regional baseline populations (individuals)	Predicted Impact	
			60% to 80% Displacement; 0 to 1% mort (individuals per annum)	Reduction in survival rate (%)
Breeding	642	404,306	0 to 5.14	0.000 to 0.001
Non-breeding	304	456,298	0 to 2.43	0.000 to 0.001
Annual	946	456,298	0 to 7.57	0.000 to 0.002

Table 12.32 Summary of gannet seasonal predicted distributional response impacts during the operation and maintenance stage for the Project alone following the Guidance approach

Season	Predicted Abundance (OAA plus 2km)	Regional baseline populations (individuals)	Predicted Impact	
			70% Disp; 1 to 3% mort (individuals per annum)	Reduction in survival rate (%)
Breeding	642	404,306	4.49 to 13.48	0.001 to 0.003
Non-breeding	304	456,298	2.13 to 6.38	<0.001 to 0.001
Annual	946	456,298	6.62 to 19.87	0.001 to 0.004

12.10.3.71 As summarised in **Table 12.31** and **Table 12.32**, the level of impact predicted annually or seasonally does not exceed a 0.02% change in the regional baseline population survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore the magnitude of the impact is assessed as **very low**.

Significance of residual effect

12.10.3.72 With a predicted sensitivity of **medium** and a magnitude of impact of **very low**, the effect significance is therefore, **Minor Adverse** (**Not Significant**) in EIA terms.

Table 12.33 Gannet annual displacement matrix based on an abundance of 946 individuals for the OAA plus 2km buffer

Displacement (%)	Mortality rates (%)															
	0	**1**	**2**	**3**	**4**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	1	2	3	4	5	6	7	8	9	9
10	0	1	2	3	4	5	9	19	28	38	47	57	66	76	85	95
20	0	2	4	6	8	9	19	38	57	76	95	113	132	151	170	189
30	0	3	6	9	11	14	28	57	85	113	142	170	199	227	255	284
40	0	4	8	11	15	19	38	76	113	151	189	227	265	303	340	378
50	0	5	9	14	19	24	47	95	142	189	236	284	331	378	425	473
60	0	6	11	17	23	28	57	113	170	227	284	340	397	454	511	567
70	0	7	13	20	26	33	66	132	199	265	331	397	463	529	596	662
80	0	8	15	23	30	38	76	151	227	303	378	454	529	605	681	756
90	0	9	17	26	34	43	85	170	255	340	425	511	596	681	766	851
100	0	9	19	28	38	47	95	189	284	378	473	567	662	756	851	946

Fulmar

Fulmar distributional responses evidence base

12.10.3.73 Fulmar are generally considered to have low vulnerability to displacement effects from offshore wind farms and are therefore typically scoped out of detailed impact assessments. However, based on NatureScot feedback (**Table 12.1**), fulmar are scoped in for further consideration in the form of a qualitative assessment.

12.10.3.74 Although some evidence suggests fulmar may exhibit displacement behaviour, it remains inconclusive. Dierschke *et al*. (2016) classified fulmar as a species that weakly avoids offshore wind farms, though this conclusion was based on limited data. More recently, Lamb *et al*. (2024) conducted a meta-analysis indicating significant displacement effects; however, the study also highlighted that fulmar were infrequently recorded and typically occurred at low densities, making robust detection of displacement challenging. Some displacement was observed at the BARD Offshore Wind Farm (Braasch *et al.,* 2015), whereas Vanermen *et al*. (2019) reported no significant displacement at the Thorntonbank Offshore Wind Farm.

12.10.3.75 Bradbury *et al*. (2014) assessed seabird vulnerability to displacement based on disturbance susceptibility and habitat specialisation, scoring species from one (lowest vulnerability) to five (highest). Fulmar scored one in both categories, placing it in the lowest risk group. In line with Joint SNCB guidance (SNCBs, 2022), species are only progressed to quantitative assessment if they score three or higher in either category. Fulmar does not meet this threshold and is not listed as a priority species in NatureScot guidance (NatureScot, 2023f).

12.10.3.76 Ecologically, fulmar are generalist feeders, exploiting a wide range of pelagic and intertidal prey, and scavenging fish offal from vessels (Ojowski *et al.,* 2001; Camphuysen and Garthe, 1997; Hamer *et al.,* 1997; Bourne, 1997). Despite being tied to breeding colonies during the breeding season, they exhibit extensive foraging ranges. Woodward *et al*. (2019) report a MMFR plus one SD of 542 ± 657.9km. Remarkably, tracked individuals from Eynhallow, Scotland, have been recorded foraging in the Charlie-Gibbs Fracture Zone in the Mid-Atlantic Ridge, approximately 6,200km from the colony (Edwards *et al.,* 2013). Consequently, even if fulmar were displaced, the additional foraging distance would be negligible relative to their typical foraging behaviour, and their dietary flexibility would facilitate adaptation to alternative foraging grounds.

Sensitivity or value of receptor

12.10.3.77 As concluded within **Table 12.17**, the overall sensitivity of the receptor is considered to be **low** to distributional response effects.

Magnitude of impact

12.10.3.78 Based on the available research discussed above, there is not considered any realistic pathway to effect for fulmar, with limited research suggesting any potential for impacts from distributional responses. Even if fulmar were to avoid the OAA, their large foraging range and high habitat flexibility would result in this having negligible fitness consequences. Therefore, the magnitude is assessed as **very low**, indicating that the potential is for limited to no disturbance and / or loss of habitat that does not threaten the long-term viability of the regional populations.

Significance of residual effect

12.10.3.79 With a predicted sensitivity of **low** and a magnitude of impact of **very low,** the effect is therefore of **Negligible Adverse** (**Not Significant**) in EIA terms.

Migratory birds (barrier effects)

Evidence base

12.10.3.80 Wind farms can act as physical obstacles to birds, causing them to alter behavioural decisions, thus creating potential barriers to their movements. Birds may deviate from current flight trajectories in response to visual stimuli from the turbines and associated infrastructure. They may react by increasing or decreasing their flight altitude, by flying around the periphery of the wind farm, or by being attracted to the wind farm. This may affect both transient migrants and resident birds breeding and foraging in the region. Barrier effects from wind farms can occur in diurnal bird species, but also in nocturnal species that are affected by artificial light.

12.10.3.81 Post-construction environmental impact studies have frequently shown that the number of recorded bird species and their abundance are significantly lower near operational offshore wind farms than outside the wind farm area. This indicates avoidance behaviour and provides indirect evidence for possible barrier effects. Such effects may vary strongly between species, with some showing strong avoidance responses while others are less affected.

12.10.3.82 Ducks, geese, divers and gannets are known to generally avoid entering or crossing offshore wind farms (for example, Desholm and Kahlert, 2005, Masden *et al.,* 2009, Plonczkier and Simms, 2012; Aumüller *et al.,* 2013; Dierschke *et al.,* 2016; Peschko *et al.,* 2021). Under conditions of high visibility, flocks of migrating sea ducks and geese may actively change their flight paths at distances of at least 1-2km and thus avoid entering the wind farm footprint (Desholm and Kahlert, 2005; Pettersson, 2005; Petersen *et al.,* 2006; Krijgsveld *et al.,* 2011; Vanermen *et al.,* 2013).

12.10.3.83 Large gulls and terns seem less prone to avoid wind farms (for example, Hill *et al.,* 2014, Vanermen *et al.,* 2015; Dierschke *et al.,* 2016; Stienen *et al.,* 2024) and tend to be attracted by turbine structures or associated vessels. Cormorants and shags are strongly attracted to offshore wind farms (Dierschke *et al.,* 2016, Vanermen and Stienen, 2019) and have been observed regularly using the basement structures of turbines as perches.

12.10.3.84 Most migratory landbirds (passerines, waders) fly at heights well above the maximum turbine blade height (Alerstam, 1990) and therefore, most are likely to fly at a significant height over the offshore wind farm, rather than around it. Landbirds that migrate at night are attracted to artificial light when visibility is poor under adverse weather conditions (Hill *et al.,* 2014; Hüppop *et al.,* 2019), though little is currently known about the relative roles of deterrent and attraction effects of wind turbines on birds flying at night in the marine environment. Measurements at the Alpha Ventus wind farm in the German North Sea have suggested that nocturnal migrants can distinguish between stationary and rotating turbines and exhibit pronounced micro-avoidance behaviour towards rotating turbines at close range (Schulz *et al.,* 2014; Hill *et al.,* 2014).

12.10.3.85 While avoidance is primarily associated with a reduced collision risk, altering flight paths around a wind farm requires birds to fly longer, less direct routes rather than the most efficient route. Such extended flights could lead to increased energy expenditure, which could negatively impact a bird's energy balance and its ability to survive and reproduce. The risk from a barrier effect can be of more concern for resident birds that commute on a day-to-day basis between roosting/breeding areas and foraging locations. Barrier effects imposed by wind farms could disrupt connectivity between existing foraging areas and breeding / roosting locations, potentially impacting local populations. However, for migratory birds that encounter a specific wind farm area only once per season, it is unlikely that detours around the area would increase energy expenditure beyond a critical threshold that could negatively impact survival probability and reproductive success.

12.10.3.86 Masden *et al.* (2009) measured the detour taken by common eiders when approaching a single wind farm in the Baltic Sea. The estimated additional flight distance required to circumvent the wind farm was about 500m, which would appear negligible considering a total migration route of about 1,400km. Speakman *et al.* (2009) and Masden *et al.* (2010, 2012) calculated that the costs of one-off avoidances during migration accounted for less than 2% of available fat reserves. For migrating birds, this increase in energy demand is insignificant when compared to other factors affecting the energy demand of migration, such unsuitable wind conditions (Masden *et al.,* 2010). When viewed cumulatively, however, several wind farms along the migration route could in theory result in cumulative energetic costs (Fox *et al.,* 2006; Masden *et al.,* 2009). Assuming 100 hypothetical detours, Masden *et al.* (2009) calculated that an individual common eider could lose up to 1% of its body mass.

12.10.3.87 While some migratory bird species may fly longer distances around offshore wind farms, barrier effects that have negative impacts on survival and reproduction are not expected as the associated energetic costs for circumventing wind farm areas are likely to be negligible in relation to the overall distance of migration travelled. However, it is currently unclear how routinely migratory birds would transit between two distinct foraging or staging areas during the non-breeding season. It is likely that during this period, birds would transit irregularly between habitats in response to fluctuating prey availability rather than on a regular basis as would be the case during the breeding season for central place foragers (Bell, 1990). There is evidence to suggest that birds habituate to marine infrastructure and can adapt their flight routes to foraging sites, and therefore after first encountering a wind farm array area, could subsequently alter their route to minimise any significant deviation required (Grecian *et al.,* 2018).

12.10.3.88 Besides species-specific ecology and behaviour, wind farm characteristics (turbine location, height, number and layout) are decisive factors determining the extent of a potential barrier effect. Wind farms placed directly within major migration corridors are more likely to disrupt bird movements than those located in areas with less migration traffic. Barrier effects are likely to becomes more significant with the increasing scale and density of wind farms, especially if multiple developments are located along major migratory flyways (Hüppop *et al.,* 2019). It can also be assumed that taller turbines will be more visible to birds from greater distances than smaller ones, potentially triggering behavioural responses at greater distances (Hüppop *et al.,* 2019). However, there is currently no empirical basis for analysing relationships between wind farm dimensions and the strength of the assumed barrier effects.

Sensitivity or value of receptor

12.10.3.89 The overall sensitivity of the receptors is likely to be highly variable depending on the receptor in question ranging from **low** to **high** for barrier effects, though when considering one-off movements during migration **low** is more likely for most species.

Magnitude of impact

12.10.3.90 Based on the available research discussed above, there is a limited pathway for barrier effects to impact survival and reproductive fitness of migratory species. For those known to avoid entering wind farm areas, such as ducks, geese, divers and gannets, the associated increase in energetic costs of circumnavigating the OAA are likely to be negligible considering the overall distance travelled during migratory movements and considering a migratory bird may only encounter the OAA once during such movements. Moreover, most migratory landbirds typically fly well above the maximum turbine height and will not need to deviate their flight paths, although some will fly within or below the rotor height of offshore turbines, depending on the prevailing weather conditions. Whilst there is a pathway for impact, any consequent small deviation from their migratory routes is highly unlikely to negatively affect their survival or fitness. Therefore, the magnitude is assessed as **very low**, indicating that the potential is for limited to no barrier effect that does not threaten the long-term viability of migratory bird populations.

Significance of residual effect

12.10.3.91 With a predicted overall sensitivity of **low** to **high** and a magnitude of impact of **very low**. The effect significance is therefore, **Negligible** to **Minor Adverse** (**Not Significant**) in EIA terms.

12.10.4 Impact O3: collision risk (Option Agreement Area)

Overview

12.10.4.1 The maximum assessment scenario relating to collision risk is presented in **Table 12.11**. Where predicted effects are identified, an assessment of the magnitude of change for each effect has been completed based on the methodology provided in **Section 12.8.2**. The magnitude of change, and hence the significance of potential effects has been assessed on the assumption that the embedded environmental measures from **Table 12.12** have been implemented as part of the Project.

12.10.4.2 There is potential risk to birds from offshore wind farms through collision with WTGs, resulting in injury or fatality. This may occur when birds fly through the OAA whilst foraging for food, commuting between breeding sites and foraging areas, or during migration.

12.10.4.3 With respect to seabirds, Collision Risk Modelling (CRM) has been carried out for the Project, with detailed methods and results presented in **Volume 3, Appendix 12.3**. The seabirds concluded within **Table 12.17** as potentially at risk of collision based on their flight behaviour and recorded abundance within the Project are as follows:

- kittiwake;
- great black-backed gull;
- herring gull;
- lesser black-backed gull;
- great skua; and
- gannet.

12.10.4.4 CRM was undertaken using the Caneco version of the stochastic Collision Risk Model (sCRM) (Caneco and Humphries, 2022), using the recommended parameters within NatureScot Guidance Note 7 (NatureScot, 2025b) for each seabird species.

12.10.4.5 The sCRM tool is recommended within the latest NatureScot CRM guidance (NatureScot, 2025b) and is based on the Band (2012) offshore CRM model which incorporates variation and statistical uncertainty around the parameters used to calculate collision frequency. The basic model, which assumes a uniform flight height distribution across the rotor swept heights, was used rather than the extended model, which uses species-specific modelled flight height distributions to account for variation in the distribution of flights across the rotor swept heights (Band, 2012; Johnston *et al.,* 2014a, b). The extended model usually results in lower collision estimates than the basic model for a given avoidance rate and set of wind farm parameters, therefore the basic model is considered more precautionary.

12.10.4.6 Only Band Option 2, using generic flight height data, is considered within this Report, as no site-specific flight height data were collected using a method for which NatureScot agrees as appropriate to inform Band Option 1 outputs.

12.10.4.7 CRM accounts for several different species-specific behavioural aspects, including the height at which birds fly, their avoidance response to WTGs and how active they are diurnally and nocturnally. Details of these considerations are provided in **Volume 3, Appendix 12.3**.

12.10.4.8 In order to provide a range of values to capture variability for each species, the Applicant has run both a 'best-case' and 'worst-case' scenario for all species as recommended within NatureScot Guidance Note 7 (NatureScot, 2025b), the results of which can be found in **Volume 3, Appendix 12.3**. For the purposes of assessment, only the worst-case scenario has been assessed to ensure precaution in assessment conclusions.

12.10.4.9 Migratory collision risk has also been modelled for seabirds, waders, passerines, raptors and wildfowl which may intersect the OAA whilst undertaking annual migratory movements. Migratory collision risk was assessed using the mCRM tool (as advised in NatureScot Guidance Note 7 (NatureScot, 2025b)), with the assessment considering information (notably species flight paths and population sizes) from The Scottish Government's strategic study of collision risk for birds on migration (Woodward *et al.,* 2023). As with the sCRM tool outlined above, the mCRM tool calculates mortalities for each species considering biometric (for example, body length) and behavioural data (for example, avoidance rates). Assessments were undertaken for both the worst-case and best-case design scenarios. Full details on methods and results of the mCRM assessment are provided in **Volume 3, Appendix 12.6**.

Uncertainty around modelling input parameters to inform predicted impacts

12.10.4.10 As modelling undertaken to inform collision risk is based on theoretical calculation, it is important to understand the evidence bases used to inform recommended input parameters and the subsequent appropriateness of such values to inform assessment.

12.10.4.11 With respect to flight speed, it is highly likely that the speed at which a bird flies is highly dependent on both wind speed and the type of flight behaviour exhibited. For instance, a seabird's flight speed when commuting or during migratory flights is likely to differ from when it is actively foraging. Within the original Band model and subsequent sCRM updated model (Caneco and Humphries, 2022), an increase in flight speed leads to a greater flux of birds predicted to pass through the offshore wind farm, thus increasing collision risk. Within the guidance document for the original Band (2012) model, one area of uncertainty identified related to species biometrics, including flight speed due to the parameters being a single fixed value, which would represent birds undertaking a single behavioural flight type. The author stated within the guidance (Band, 2012) uncertainty relating to species biometrics and flight speed could affect the predicted impact by up to ±20%.

12.10.4.12 The flight speeds advocated within the NatureScot Guidance Note 7 (NatureScot, 2025b) are currently derived from Pennycuick (1997) for gannet and Alerstam *et al.* (2007) for herring gull, great black-backed gull, lesser black-backed gull, great skua and kittiwake, though it is recognised that more recent studies are available. A review of the appropriateness of flight speeds within Pennycuick (1997) and Alerstam *et al.* (2007) to inform modelling was provided within the Crown Estate Round 4 Plan Level HRA collision modelling annex (NIRAS, 2022):

"*The flight speed for gannet calculated in Pennycuick (1997) is based on a small sample size with these data having been collected from birds flying at a breeding colony (Foula, Shetland). It is therefore possible that the flight speeds recorded are not representative of the flight speeds of birds foraging offshore. This is therefore likely to over-estimate collision risk estimates and increase the uncertainty associated with these estimates.*

The birds observed by Alerstam et al. (2007) were located either in southern Sweden or within the Arctic circle and no differentiation is provided between migratory or foraging birds from colonies. Indeed, the large range of species included in Alerstam et al. (2007) suggests that non-breeding and/or migratory flights comprised a significant component of the data set. This is therefore likely to over-estimate collision risk estimates and increase the uncertainty associated with these estimates."

12.10.4.13 Flight speeds of seabirds within an operational offshore wind farm have been collected at Thanet Offshore Wind Farm as part of the Offshore Renewables Joint Industry Programme (ORJIP) avoidance study (Skov *et al*., 2018). This study used laser rangefinder tracking data to estimate flight speed both inside and outside the Thanet Offshore Wind Farm from 284 tracks over a period of approximately two years. Overall, flight speeds for both kittiwake and gannet were calculated to be considerably slower than as currently recommended. This difference could be due to a number of factors such as differing temporal and spatial scales of data collection, limited data collected within Pennycuick (1997) and Alerstam *et al.* (2007), behavioural response to the offshore wind farm development or methodological differences.

12.10.4.14 Improvement in flight speed parameters for inclusion within assessment was recently assessed by Cook *et al.* (2023) on behalf of the Scottish Government. Cook *et al.* (2023) concluded:

"*Typical flight speeds may be lower than those reported in these previous studies, which are often collected in areas which may not be representative of conditions experienced offshore (Alerstam et al. 2007; Pennycuick, 1997). Accounting for these differences can result in a substantial reduction in the predicted collision rate*."

12.10.4.15 These studies suggest that currently advocated flight speeds are likely to be inflating the predicted impact of collision.

12.10.4.16 The recommended SNCB (2024) Nocturnal Activity Factors (NAFs) for seabirds are derived from Cook *et al.* (2023) for gannet, kittiwake and lesser black-backed gull. For herring gull and great black-backed gull, NAFs are derived from Garthe and Hüppop (2004). Prior to the recent CRM guidance updates (SNCBs, 2024), all NAFs were derived from Garthe and Hüppop (2004), which used a scoring index of expected NAF based on literature review and personal observations. Cook *et al.* (2023), provided updated parameters based on GPS tags deployed at colonies around the UK, the results of which recommended reduced NAFs comparative to the Garthe and Hüppop (2004) scoring indices. However, the author did note significant variability in NAF between colonies and years of deployment due to significant variation in day time activity, suggesting that wider environmental conditions should be considered to ensure appropriate transferability within assessment (Cook *et al.,* 2023). Additionally, the results of Cook *et al.* (2023) relates to the breeding season only, such rates therefore may not appropriately represent nocturnal activity during the non-breeding season. For herring gull and great black-backed gull, the results from Cook *et al.* (2023) suggest that the use of Garthe and Hüppop (2004) may not be appropriate for at least the breeding season.

12.10.4.17 The Bird Collision Avoidance Study funded by ORJIP, considered the potential avoidance rate of seabirds in response to Thanet Offshore Wind Farm (Skov *et al.,* 2018). Over the two-year study period (between 2014 and 2016) over 12,000 bird movements were recorded throughout the day and night (Skov *et al.,* 2018). It was reported that only six birds (all gull species) in total collided with wind turbines suggesting there is still significant levels of precaution within the latest avoidance rates recommended for modelling. Although the avoidance rates determined from the Thanet Offshore Wind Farm study (Skov *et al.,* 2018) were considered within the determination of SNCBs latest recommended rates (SNCBs, 2024), the recommended species-specific rates from the study are far higher than those currently recommended in SNCB guidance (SNCBs, 2024).

12.10.4.18 The most recent empirical study of collision risk to seabirds (AOWFL, 2023) was undertaken over two years off the coast of Aberdeen at an offshore wind farm site with 11 wind turbines. This study collected data during the breeding and post-breeding season (covering the months of April to October 2020 and 2021). The study, which was based on over 10,000 bird videos over a two-year period, was able to estimate avoidance rates (in the micro and meso space), which were determined to be very high, suggesting that current collision model parameters are likely to overestimate risk.

12.10.4.19 Within the latest guidance (SNCBs, 2024), the avoidance rates outlined in the Ozsanlav-Harris *et al.* (2023) paper, are used. It must be noted that the current recommended values are mainly based on observations from onshore and coastal wind farms, which have significantly different design to offshore developments (such as far smaller air gap resulting in greater overlap of key seabird flight heights) and birds' flight behaviour may differ between the onshore and offshore environment, resulting in difference in susceptibility to collision. The study concluded that for gannet and kittiwake a generic 'all gull' rate is recommended, and for lesser black-backed gull, herring gull and great black-backed gull, a generic 'large gull rate' is recommended for use as the avoidance rate. These recommendations are despite the provision of species-specific avoidance rates within the study. Not using species specific avoidance rates, but rather, generic rates, adds precaution to the assessment as it does not account for inter-specific variation in the avoidance behaviour between species.

12.10.4.20 Therefore, it is considered that the CRM input parameters used in the assessment of collision risk to seabirds for the Project and those from other developments, especially cumulatively, incorporate a high degree of precaution for all species assessed. Examples of the level of sensitivity of CRM to changes in even a single variable have been provided for other recent offshore wind farm developments (GoBe, 2025; APEM, 2024; APEM, 2022c), resulting in significant reductions in predicted impact.

Kittiwake

Sensitivity or value of receptor

12.10.4.21 As concluded within **Table 12.17**, the overall sensitivity of the receptor to collision risk is considered to be **medium**.

Magnitude of impact

12.10.4.22 The level of predicted impact in relation to collision risk during the operation and maintenance stage is provided in **Table 12.34**. There is no deviation between the preferred approach proposed by the Developer and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised above and how this may affect the impact predictions presented.

Table 12.34 Summary of kittiwake seasonal predicted collision risk impacts during the operation and maintenance stage for the Project alone

Season	Regional baseline populations (individuals)	Predicted Impact	
		Predicted collisions (individuals per annum)	Reduction in survival rate (%)
Breeding	283,312	22.54	0.008
Non-breeding	829,937	16.06	0.002
Annual	829,937	38.60	0.005

12.10.4.23 As summarised in **Table 12.34**, the level of impact predicted annually or seasonally does not exceed a 0.02% change in the regional baseline population survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore the magnitude of the impact is considered to be **very low.**

Significance of residual effect

12.10.4.24 With a predicted sensitivity of **medium** and a magnitude of impact of **very low** the effect significance is therefore, **Minor Adverse** (**Not Significant**) in EIA terms.

Great black-backed gull

Sensitivity or value of receptor

12.10.4.25 As concluded within **Table 12.17**, the overall sensitivity of the receptor to collision risk is considered to be **medium**.

Magnitude of impact

12.10.4.26 The level of predicted impact in relation to collision risk during the operation and maintenance stage is provided in **Table 12.33.**There is no deviation between the preferred approach proposed by the Developer and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised above and how this may affect the impact predictions presented.

Table 12.35 Summary of great black-backed gull seasonal predicted collision risk impacts during the operation and maintenance stage for the Project alone

Season	Regional baseline populations (individuals)	Predicted Impact	
		Predicted collisions (individuals per annum)	Reduction in survival rate (%)
Breeding	59,329	2.84	0.005
Non-breeding	91,399	16.66	0.018
Annual	91,399	19.50	0.021

12.10.4.27 As summarised in **Table 12.35**, the level of impact predicted in the non-breeding season and annually exceeds the 0.02% change in the regional baseline population survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) further consideration of the potential impact is required in the form of PVA.

12.10.4.28 PVA has been undertaken for the 35-year operational lifetime of the Project and modelled using the regional baseline population of 91,399 individuals. Outputs are presented in **Table 12.36** below, including the predicted median reduction in CGR and median reduction in CPS. PVA modelling was undertaken using density independent modelling, and therefore the CGR value is considered a more reliable metric than CPS values for interpreting impacts (Cook and Robinson, 2016). For full details on PVA methodology, see **Volume 3, Appendix 12.4**.

Table 12.36 PVA results for predicted collision risk impacts on great black-backed gull for the Project alone

Scenario modelled	Annual increase in mortality	Density independent counterfactual metric (35yrs)			
		Median CGR (standard deviation (SD))	Reduction in annual growth rate (%)	Median CPS (SD)	Reduction in final population size after 35yrs (%)
Project alone annual CRM	19.50	1.000	0.02	0.991	0.87

12.10.4.29 As presented in **Table 12.36**, the reduction in growth rate is 0.02% per annum. Such a minimal change in the annual growth rate would be indistinguishable from natural fluctuations in the population, therefore the magnitude of the impact is assessed as **low**.

Significance of residual effect

12.10.4.30 With a predicted sensitivity of **medium** and a magnitude of impact of **low** the effect significance is therefore, **Minor Adverse** (**Not Significant**) in EIA terms.

Herring gull

Sensitivity or value of receptor

12.10.4.31 As concluded within **Table 12.17,** the overall sensitivity of the receptor to collision risk is considered to be **medium**.

Magnitude of impact

12.10.4.32 The level of predicted impact in relation to collision risk during the operation and maintenance stage is provided in **Table 12.37**. There is no deviation between the preferred approach proposed by the Developer and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised above and how this may affect the impact predictions presented.

Table 12.37 Summary of herring gull seasonal predicted collision risk impacts during the operation and maintenance stage for the Project alone

Season	Regional baseline populations (individuals)	Predicted Impact	
		Predicted collisions (individuals per annum)	Reduction in survival rate (%)
Breeding	256,222	0.78	<0.001
Non-breeding	307,422	6.44	0.002
Annual	307,422	7.23	0.002

12.10.4.33 As summarised in **Table 12.37**, the level of impact predicted annually or seasonally does not exceed a 0.02% change in the regional baseline population survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore the magnitude of the impact is considered to be **very low**.

Significance of residual effect

12.10.4.34 With a predicted sensitivity of **medium** and a magnitude of impact of **very low** the effect significance is therefore, **Minor Adverse** (**Not Significant**) in EIA terms.

Lesser black-backed gull

Sensitivity or value of receptor

12.10.4.35 As concluded within **Table 12.17**, the overall sensitivity of the receptor to collision risk is considered to be **medium**.

Magnitude of impact

12.10.4.36 The level of predicted impact in relation to collision risk during the operation and maintenance stage is provided in **Table 12.38**. There is no deviation between the preferred approach proposed by the Developer and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised above and how this may affect the impact predictions presented.

Table 12.38 Summary of lesser black-backed gull seasonal predicted collision risk impacts during the operation and maintenance stage for the Project alone

Season	Regional baseline populations (individuals)	Predicted Impact	
		Predicted collisions (individuals per annum)	Reduction in survival rate (%)
Breeding	N/A	N/A	N/A
Non-breeding	209,007	0.27	<0.001
Annual	209,007	0.27	<0.001

12.10.4.37 As summarised in **Table 12.38**, the level of impact predicted annually or seasonally does not exceed a 0.02% change in the regional baseline population survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore the magnitude of the impact is considered to be **very low.**

Significance of residual effect

12.10.4.38 With a predicted sensitivity of **medium** and a magnitude of impact of **very low** the effect significance is therefore, **Minor Adverse** (**Not Significant**) in EIA terms.

Great skua

Sensitivity or value of receptor

12.10.4.39 As concluded within **Table 12.17**, the overall sensitivity of the receptor is considered to be **medium** to collision risk.

Magnitude of impact

12.10.4.40 The level of predicted impact in relation to collision risk during the operation and maintenance stage is provided in **Table 12.39**. There is no deviation between the preferred approach proposed by the Applicant and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised above and how this may affect the impact predictions presented.

Table 12.39 Summary of great skua seasonal predicted collision risk impacts during the operation and maintenance stage for the Project alone

Season	Regional baseline populations (individuals)	Predicted Impact	
		Predicted collisions (individuals per annum)	Reduction in survival rate (%)
Breeding	27,439	0.68	0.002%
Non-breeding	N/A	-	-
Annual	27,439	0.68	0.002%

12.10.4.41 As summarised in **Table 12.39**, the level of impact predicted annually or seasonally does not exceed a 0.02% change in the regional baseline population survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore the magnitude of the impact is considered to be **very low.**

Significance of residual effect

12.10.4.42 With a predicted sensitivity of **medium** and a magnitude of impact of **very low** the effect significance is therefore, **Minor Adverse** (**Not Significant**) in EIA terms.

Gannet

Sensitivity or value of receptor

12.10.4.43 As concluded within **Table 12.17**, the overall sensitivity of the receptor is considered to be **medium** to collision risk.

Magnitude of impact

12.10.4.44 The level of predicted impact in relation to collision risk during the operation and maintenance stage is provided in **Table 12.40**. There is no deviation between the preferred approach proposed by the Applicant and that recommended within NatureScot's Guidance Note 7 (NatureScot, 2025b). However, when considering the impact predictions presented it is important to recognise the uncertainty and limitations summarised above and how this may affect the impact predictions presented.

Table 12.40 Summary of gannet seasonal predicted collision risk impacts during the operation and maintenance stage for the Project alone

Season	Regional baseline populations (individuals)	Predicted Impact	
		Predicted collisions (individuals per annum)	Reduction in survival rate (%)
Breeding	404,306	39.78	0.010
Non-breeding	456,298	3.18	0.001
Annual	456,298	42.95	0.009

12.10.4.45 As summarised in **Table 12.40**, the level of impact predicted annually or seasonally does not exceed a 0.02% change in the regional baseline population survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore the magnitude of the impact is considered to be **very low.**

Significance of residual effect

12.10.4.46 With a predicted sensitivity of **medium** and a magnitude of impact of **very low** the effect significance is therefore, **Minor Adverse** (**Not Significant**) in EIA terms.

Migratory birds

Sensitivity or value of receptor

12.10.4.47 Migratory collision risks have not been significantly studied in the offshore environment. However, most migration occurs on a broad front and above rotor-swept heights, although adverse weather may reduce flight heights. Therefore, vulnerability is considered to be low to medium overall. Conservation value for the 70 assessed species varies widely from low to high. Therefore, as a precautionary approach, the overall sensitivity is considered to be **medium**.

Magnitude of impact

12.10.4.48 There is potential that seabirds, waders, passerines, raptors and wildfowl may intersect the OAA whilst undertaking annual migratory movements from breeding and wintering grounds. Such movements are difficult to accurately record by conventional means of survey due to some birds migrating at night, when no surveys are conducted, or in pulse movements which may be missed due to the snapshot nature of monthly surveys. The potential impact of collision on migratory birds has been assessed using the Marine Scotland Avian Migration Collision Risk Model Shiny Application ("mCRM tool"; HiDef Aerial Surveying Limited, 2024), as advised by NatureScot within consultation (**Table 12.1**).

12.10.4.49 As a precautionary approach, the mCRM assessment considered all possible species within the mCRM tool, resulting in 70 species being taken through to assessment. The proportion of birds passing through the Project OAA was determined through the mCRM tool, utilising information on population sizes and flight paths in Woodward *et al.* (2023). For each species, the number of subsequent mortalities was determined, based on default parameters in the mCRM tool (with the exceptions noted within NatureScot's advice in (**Table 12.1**), notably migratory flight heights and flight speeds, and migratory avoidance rates and behaviour. Further details of the approach to migratory collision risk modelling are provided within **Volume 3, Appendix 12.6**.

12.10.4.50 The maximum predicted impact varied between the worst case scenario and most likely scenario design and therefore both scenarios are presented within **Table 12.41**.

12.10.4.51 As summarised in **Table 12.41**, the level of impact predicted annually or seasonally does not exceed a 0.02% change in the regional baseline population survival rate for any receptor. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the populations, therefore the magnitude of the impact is considered to be **very low**.

Table 12.41 Quantitative assessment of collision risk to migratory species using the mCRM tool

Species	Scientific name	Total UK population (Woodward *et al.*, 2023)	Number of individuals crossing the OAA per annum	Predicted collision mortalities per annum (BCS)	Percentage point change in survival rate (BCS)	Predicted collision mortalities per annum (WCS)	Percentage point change in survival rate (WCS)
Whooper swan	*Cygnus cygnus*	39,990	1,127	1.55	0.004	1.78	0.004
Bewick's swan	*Cygnus columbianus bewickii*	4,382	0	0.00	0	0.00	0
Taiga bean goose	*Anser fabalis*	970	52	0.01	0.001	0.01	0.001
Pink-footed goose	*Anser brachyrhynchus*	500,000	0	0.00	0	0.00	0
Greenland white-fronted goose	*Anser albifrons flavirostris*	21,500	0	0.00	0	0.00	0
European white-fronted goose	*Anser albifrons albifrons*	12,000	0	0.00	0	0.00	0
Icelandic greylag goose	*Anser anser*	68,400	0	0.00	0	0.00	0

Species	Scientific name	Total UK population (Woodward *et al.*, 2023)	Number of individuals crossing the OAA per annum	Predicted collision mortalities per annum (BCS)	Percentage point change in survival rate (BCS)	Predicted collision mortalities per annum (WCS)	Percentage point change in survival rate (WCS)
Svalbard barnacle goose	*Branta leucopsis*	43,500	5,641	0.92	0.002	0.97	0.002
Greenland barnacle goose	*Branta leucopsis*	72,000	0	0.00	0	0.00	0
Canadian light-bellied brent goose	*Branta bernicla hrota*	37,000	0	0.00	0	0.00	0
Svalbard light-bellied brent goose	*Branta bernicla hrota*	13,400	680	0.06	0	0.06	0
Dark-bellied brent goose	*Branta bernicla bernicla*	99,170	0	0.00	0	0.00	0
Shelduck	*Tadorna tadorna*	77,500	1,430	2.56	0.003	2.68	0.003
Wigeon	*Mareca penelope*	480,000	7,729	17.15	0.004	17.46	0.004
Gadwall	*Mareca strepera*	30,940	0	0.00	0	0.00	0

Species	Scientific name	Total UK population (Woodward *et al.*, 2023)	Number of individuals crossing the OAA per annum	Predicted collision mortalities per annum (BCS)	Percentage point change in survival rate (BCS)	Predicted collision mortalities per annum (WCS)	Percentage point change in survival rate (WCS)
Teal	*Anas crecca*	435,500	0	0.00	0	0.00	0
Mallard	*Anas platyrhynchos*	823,600	14,809	53.48	0.006	55.78	0.007
Pintail	*Anas acuta*	20,942	377	0.84	0.004	0.86	0.004
Shoveler	*Spatula clypeata*	22,960	327	1.07	0.005	1.09	0.005
Pochard	*Aythya ferina*	28,500	0	0.00	0	0.00	0
Tufted duck	*Aythya fuligula*	155,000	2,606	5.51	0.004	5.52	0.004
Scaup	*Aythya marila*	7,000	0	0.00	0	0.00	0
Long-tailed duck	*Clangula hyemalis*	12,800	287	0.62	0.005	0.63	0.005

Species	Scientific name	Total UK population (Woodward *et al.*, 2023)	Number of individuals crossing the OAA per annum	Predicted collision mortalities per annum (BCS)	Percentage point change in survival rate (BCS)	Predicted collision mortalities per annum (WCS)	Percentage point change in survival rate (WCS)
Eider	*Somateria mollissima*	106,720	1,961	1.18	0.001	1.23	0.001
Common scoter	*Melanitta nigra*	146,700	2,564	5.46	0.004	5.53	0.004
Velvet scoter	*Melanitta fusca*	4,510	104	0.23	0.005	0.24	0.005
Goldeneye	*Bucephala clangula*	37,500	852	1.85	0.005	1.87	0.005
Red-breasted merganser	*Mergus serrator*	15,840	312	0.68	0.004	0.69	0.004
Goosander	*Mergus merganser*	17,420	749	1.70	0.01	1.76	0.01
Oystercatcher	*Haematopus ostralegus*	358,900	6,111	0.96	0	1.00	0
Ringed plover	*Charadrius hiaticula*	289,520	3,613	0.47	0	0.46	0

Species	Scientific name	Total UK population (Woodward *et al.*, 2023)	Number of individuals crossing the OAA per annum	Predicted collision mortalities per annum (BCS)	Percentage point change in survival rate (BCS)	Predicted collision mortalities per annum (WCS)	Percentage point change in survival rate (WCS)
Golden plover	*Pluvialis apricaria*	3,296,500	52,020	7.13	0	7.10	0
Grey plover	*Pluvialis squatarola*	124,000	2,515	0.34	0	0.34	0
Lapwing	*Vanellus vanellus*	3,942,500	66,866	9.87	0	10.01	0
Knot	*Calidris canutus*	360,000	6,265	0.81	0	0.79	0
Sanderling	*Calidris alba*	200,000	3,230	0.41	0	0.39	0
Purple sandpiper	*Calidris maritima*	24,400	556	0.07	0	0.07	0
Dunlin	*Calidris alpina*	2,021,808	34,665	4.49	0	4.34	0
Ruff	*Calidris pugnax*	31,000	622	0.08	0	0.08	0

Species	Scientific name	Total UK population (Woodward *et al.*, 2023)	Number of individuals crossing the OAA per annum	Predicted collision mortalities per annum (BCS)	Percentage point change in survival rate (BCS)	Predicted collision mortalities per annum (WCS)	Percentage point change in survival rate (WCS)
Snipe	*Gallinago gallinago*	2,331,000	39,092	7.96	0	7.80	0
Black-tailed godwit	*Limosa limosa*	303,000	0	0.00	0	0.00	0
Bar-tailed godwit	*Limosa lapponica*	680,000	11,972	1.70	0	1.70	0
Whimbrel	*Numenius phaeopus*	936,000	13,212	1.98	0	2.03	0
Curlew	*Numenius arquata*	141,100	2,958	0.47	0	0.49	0
Greenshank	*Tringa nebularia*	7,200	144	0.02	0	0.02	0
Wood sandpiper	*Tringa glareola*	54	2	0.00	0	0.00	0
Redshank	*Tringa totanus*	747,000	11,419	0.16	0	0.17	0

Species	Scientific name	Total UK population (Woodward *et al.*, 2023)	Number of individuals crossing the OAA per annum	Predicted collision mortalities per annum (BCS)	Percentage point change in survival rate (BCS)	Predicted collision mortalities per annum (WCS)	Percentage point change in survival rate (WCS)
Turnstone	*Arenaria interpres*	347,000	5,509	0.81	0	0.81	0
Red-necked phalarope	*Phalaropus lobatus*	20	0	0.00	0	0.00	0
Dotterel	*Charadrius morinellus*	390	11	0.00	0.001	0.00	0.001
Avocet	*Recurvirostra avosetta*	13,090	0	0.00	0	0.00	0
Stone curlew	*Burhinus oedicnemus*	880	0	0.00	0	0.00	0
Marsh harrier	*Circus aeruginosus*	2,576	54	0.02	0.001	0.02	0.001
Hen harrier	*Circus cyaneus*	2,176	37	0.03	0.001	0.03	0.002
Montagu’s harrier	*Circus pygargus*	19	0	0.00	0	0.00	0

Species	Scientific name	Total UK population (Woodward *et al.*, 2023)	Number of individuals crossing the OAA per annum	Predicted collision mortalities per annum (BCS)	Percentage point change in survival rate (BCS)	Predicted collision mortalities per annum (WCS)	Percentage point change in survival rate (WCS)
Osprey	*Pandion haliaetus*	665	16	0.01	0.001	0.01	0.001
Merlin	*Falco columbarius*	8,256	41	0.07	0.001	0.08	0.001
Short-eared owl	*Asio flammeus*	14,880	254	0.21	0.001	0.22	0.001
Honey buzzard	*Pernis apivorus*	137	0	0.00	0	0.00	0
White-tailed eagle	*Haliaeetus albicilla*	296	0	0.00	0	0.00	0
Great northern diver	*Gavia immer*	11,000	179	0.00	0	0.00	0
Black-throated diver	*Gavia arctica*	1,180	31	0.01	0.001	0.01	0.001
Red-throated diver	*Gavia stellata*	34,000	811	1.58	0.005	1.58	0.005

Species	Scientific name	Total UK population (Woodward *et al.*, 2023)	Number of individuals crossing the OAA per annum	Predicted collision mortalities per annum (BCS)	Percentage point change in survival rate (BCS)	Predicted collision mortalities per annum (WCS)	Percentage point change in survival rate (WCS)
Bittern	*Botaurus stellaris*	714	2	0.00	0	0.00	0
Great crested grebe	*Podiceps cristatus*	1,380	0	0.04	0.003	0.04	0.003
Slavonian grebe	*Podiceps auritus*	3,122	61	0.04	0.001	0.04	0.001
Spotted crake	*Porzana porzana*	26	1	0.00	0	0.00	0
Corncrake	*Crex crex*	16,960	335	0.23	0.001	0.23	0.001
Nightjar	*Caprimulgus europaeus*	7,700	167	0.13	0.002	0.13	0.002

Significance of residual effect

12.10.4.52 With a predicted sensitivity of **medium** and a magnitude of impact of **very low**, the effect is therefore of **Minor Adverse** (**Not Significant**) in EIA terms.

12.10.5 Impact O2 and O3: combined collision risk and distributional response impacts (Option Agreement Aera)

Overview

12.10.5.1 For gannet and kittiwake, NatureScot guidance (NatureScot 2023f, 2025) recommends the assessment of both distributional responses and collision risk. The combined impact from these pathways is therefore considered here, based on quantitative analysis undertaken in **Sections 12.10.3** and **12.10.4**.

12.10.5.2 Combining both effect pathways can lead to overestimation because individuals displaced from the Project OAA would not simultaneously be at risk of collision. If macro-avoidance is not included in the collision risk assessment, mortalities may be double-counted when the two assessments are combined. For gannet, a macro-avoidance rate has been applied to the non-breeding season only as per NatureScot (2025b) guidance. Consequently, predicted breeding season mortalities for gannet are considered to be an overestimate, and therefore highly precautionary.

12.10.5.3 For kittiwake, the avoidance rate used in CRM (drawn from Ozsanlav-Harris *et al.*, 2023), unlike gannet, already incorporates macro-avoidance and as such applying further macro-avoidance to the CRM analysis is not recommended by NatureScot (2025b). However, as outlined in **Section 12.10.2**, kittiwake are not considered vulnerable to distributional responses based on available evidence, and so the combined impact of collision risk and distributional responses is still considered an over-estimate based on available evidence.

Kittiwake

Sensitivity or value of receptor

12.10.5.4 As concluded within **Table 12.17**, the overall sensitivity of the receptor to distributional response effects is considered to be **low** and the overall sensitivity of the receptor to collision risk is considered to be **medium**.

Magnitude of impact

12.10.5.5 In light of the evidence presented in **paragraph 12.10.3.15**, the Applicant considers there is insufficient evidence to justify a requirement to assess kittiwake for distributional response effects. Nevertheless, a Guidance approach, in combination with the predicted impact due to collision risk, is presented and assessed within **Table 12.42**, based on the recommendation of a 30% displacement rate and 1 – 3% mortality rate within NatureScot's Guidance Note 8 (NatureScot, 2023f).

Table 12.42 Summary of kittiwake seasonal predicted combined collision risk and distributional response impacts during the operation and maintenance stage for the Project alone

Season	Regional baseline populations (individuals)	Predicted Impact	
		30% Displacement; 1 to 3% mort plus CRM (individuals per annum)	Reduction in survival rate (%)
Breeding	283,312	25.21 to 30.55.	0.009 to 0.011.
Non-breeding	829,937	16.49 to 17.36.	0.002
Annual	829,937	41.70 to 47.91.	0.005 to 0.006.

12.10.5.6 As summarised in **Table 12.42**, the level of impact predicted annually or seasonally does not exceed a 0.02% change in the regional baseline population survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore the magnitude of the impact is considered to be **very low.**

Significance of residual effect

12.10.5.7 With a predicted sensitivity of **low** to **high** and a magnitude of impact of **very low**, the effect significance is therefore, **Minor Adverse** (**Not Significant**) in EIA terms.

Gannet

Sensitivity or value of receptor

12.10.5.8 As concluded within **Table 12.17**, the overall sensitivity of the receptor to distributional response effects is considered to be **medium** and the overall sensitivity of the receptor to collision risk is considered to be **medium**.

Magnitude of impact

12.10.5.9 The level of predicted impact in relation to collision risk and distributional responses during the operation and maintenance stage is provided in **Table 12.43** and **Table 12.44**. The impact predictions presented in **Table 12.43** are based on the Developer approach, whilst impact predictions in **Table 12.44** are based on displacement and mortality rates recommended within NatureScot's Guidance Note 8 (NatureScot, 2023f) forming the Guidance approach.

Table 12.43 Summary of gannet seasonal predicted combined collision risk and distributional response impacts during the operation and maintenance stage for the Project alone following the Developer approach

Season	Regional baseline populations (individuals)	Predicted Impact	
		60 to 80% Displacement; 1% mort plus CRM (individuals per annum)	Reduction in survival rate (%)
Breeding	404,306	43.62 to 44.91.	0.011
Non-breeding	456,298	5.00 to 5.61.	0.001
Annual	456,298	48.63 to 50.52.	0.011

Table 12.44 Summary of gannet seasonal predicted combined collision risk and distributional response impacts during the operation and maintenance stage for the Project alone following the Guidance approach

Season	Regional baseline populations (individuals)	Predicted Impact	
		70% Displacement; 1 to 3% mort plus CRM (individuals per annum)	Reduction in survival rate (%)
Breeding	404,306	44.26 to 53.25.	0.011 to 0.013.
Non-breeding	456,298	5.31 to 9.56.	0.001 to 0.002.
Annual	456,298	49.57 to 62.82.	0.011 to 0.014.

12.10.5.10 As concluded within **Table 12.43** and **Table 12.44**, regardless of the approach taken the level of impact predicted annually or seasonally does not exceed a 0.02% change in the regional baseline population survival rate. In accordance with NatureScot Guidance Note 11 (NatureScot, 2023g) no further consideration of the potential impact is required. Such a minimal change in survival rate would be indistinguishable from natural fluctuations in the population, therefore the magnitude of the impact is considered to be **very low.**

Significance of residual effect

12.10.5.11 With a predicted sensitivity of **medium** and a magnitude of impact of **very low**, the effect significance is therefore. **Minor Adverse** (**Not Significant**) in EIA terms.

12.10.6 Impact O4: entanglement with mooring lines

Overview

12.10.6.1 The maximum assessment scenario relating to the entanglement with mooring lines are presented in **Table 12.11**. Where predicted effects are identified, an assessment of the magnitude of change for each effect has been completed based on the methodology provided in **Section 12.8.2**. The magnitude of change, and hence the significance of potential effects has been assessed on the assumption that the embedded environmental measures from **Table 12.12** have been implemented as part of the Project.

12.10.6.2 Following the outcome of the screening process presented in **Table 12.17** the receptors undergoing assessment for entanglement with mooring lines include:

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

Sensitivity or value of receptor

12.10.6.3 As detailed within **Table 12.17**, the sensitivity of receptors scoped in for assessment of entanglement with mooring lines is **medium**.

Magnitude of impact

12.10.6.4 There is a potential risk to diving seabirds resulting from entanglement with mooring cables whilst foraging. Entanglement can be classified as 'primary entanglement' whereby seabirds could become directly entangled in the mooring cables and associated infrastructure or 'secondary entanglement' whereby seabirds could become entangled in debris (primarily fishing gear) snagged on mooring lines and associated infrastructure.

12.10.6.5 As concluded within the literature reviews undertaken by Ocean Science Consulting (OSC, 2022) and SEER (2022) primary entanglement is considered unlikely due to the mooring lines being under tension and the dimensions of the chain compared to the size of seabirds.

12.10.6.6 Seabirds are known to become entangled in marine debris, including discarded fishing nets, which may lead to birds dying through being drowned (Ryan, 2018), though no evidence was found relating to such events in relation to fishing nets caught up on mooring lines. In relation to secondary entanglement, the potential for discarded and lost fishing gear to be become snagged on the mooring line is considered to be a possibility, though there is high uncertainty around the frequency and scale of such occurrence. The potential risk posed to seabirds will also be highly variable depending on the degree of anthropogenic activity (disturbance) within the region, availability of prey around mooring lines, turbidity of water, and the type of fishing gear snagged, though overall the potential risk for entanglement is likely to be minimal (OSC, 2022).

12.10.6.7 It is important to note that seabirds concluded as potentially at risk of entanglement (auks and gannet), are also considered to be disturbed and consequently displaced by offshore wind farms. If the predicted displacement rates and distances assessed within **Section 12.10.2** are accurate, the consequent displacement effect would eliminate the potential pathway for the majority of individuals.

12.10.6.8 Therefore, the magnitude of the impact relating to potential entanglement for the Project will have on any receptor is considered to be **very low** in light of the above evidence suggesting there is highly limited potential for such an effect pathway to occur.

Significance of residual effect

12.10.6.9 The Project embedded environmental measures (as shown in **Table 12.12**) include routinely inspecting mooring lines and removing any snagged fishing gear. Overall, it is predicted that the sensitivity of receptors is **medium**, and the magnitude is **very low** the effect is **Minor Adverse** (**Not Significant**) in EIA terms.

12.11 Assessment of effects: Decommissioning stage

12.11.1 Introduction

12.11.1.1 This Section provides an assessment of the effects for offshore and intertidal ornithology from the decommissioning of the offshore elements of the Project.

12.11.1.2 The assessment methodology set out in **Section 12.8** has been applied to assess effects to offshore and intertidal ornithology from the Project.

12.11.1.3 The worst-case scenario for decommissioning activities for the Project is considered to be equal to or less than the worst-case scenario for the construction stage as assessed in **Section 12.9**. To avoid repetition of assessments the conclusions drawn within **Section 12.9** are considered to be representative of the potential impact during the decommissioning for the same effect pathway. For all identified effect pathways, a conclusion of no significant effect in EIA terms was concluded, therefore no significant effect is expected during the decommissioning stage.

12.11.1.4 Closer to the time of decommissioning, there is the potential that removal of infrastructure could lead to a greater environmental impact than leaving some components in situ, (for example, sub-sea cables left buried). This may further reduce the potential impact of any decommissioning activities required.

12.12 Summary of effects

12.12.1.1 A summary of the effects arising from construction, O&M and decommissioning stages of the Project in relation to offshore and intertidal ornithology are summarise in **Table 12.45**.

Table 12.45 Summary of effects during the construction, O&M and decommissioning stages of the Project on offshore and intertidal ornithology

Receptor	Sensitivity or value	Activity and potential effect	Embedded environmental measures	Magnitude of effect	Assessment of residual likely significant effects
Construction					
Eider	**Medium**	Direct temporary habitat loss / disturbance (offshore export cable corridor landfall).	M-056	**Very low**	**Minor Adverse** (**Not significant**).
Kittiwake	**Medium**	Indirect impacts due to effects on prey species and habitats.	N/A	**Very low**	**Minor Adverse** (**Not significant**).
Herring gull	**Low**	Direct temporary habitat loss / disturbance (offshore export cable corridor landfall).	M-056	**Very low**	**Minor Adverse** (**Not significant**).
Sandwich tern	**High**	Direct temporary habitat loss / disturbance (offshore export cable corridor landfall).	M-056	**Very low**	**Minor Adverse** (**Not significant**).
Guillemot	**Medium**	Direct temporary habitat loss / disturbance (OAA).	M-032	**Very low**	**Minor Adverse** (**Not significant**).
	Medium	Direct temporary habitat loss / disturbance (offshore export cable corridor landfall).	M-056	**Very low**	**Minor Adverse** (**Not significant**).

Receptor	Sensitivity or value	Activity and potential effect	Embedded environmental measures	Magnitude of effect	Assessment of residual likely significant effects
	Medium	Indirect impacts due to effects on prey species and habitats.	N/A	**Very low**	**Minor Adverse** (**Not significant**).
Razorbill	**Medium**	Direct temporary habitat loss / disturbance (OAA).	M-032	**Very low**	**Minor Adverse** (**Not significant**).
	Medium	Indirect impacts due to effects on prey species and habitats.	N/A	**Very low**	**Minor Adverse** (**Not significant**).
Puffin	**Medium**	Direct temporary habitat loss / disturbance (OAA).	M-032	**Very low**	**Minor Adverse** (**Not significant**).
	Medium	Indirect impacts due to effects on prey species and habitats.	N/A	**Very low**	**Minor Adverse** (**Not significant**).
Shag	**Medium**	Direct temporary habitat loss / disturbance (offshore export cable corridor landfall).	M-056	**Very low**	**Minor Adverse** (**Not significant**).
Operation and maintenance					
Kittiwake	**Low**	Distributional responses (OAA).	N/A	**Very low**	**Negligible Adverse** (**Not significant**).
	High	Collision risk (OAA).	M-046	**Very low**	**Minor Adverse** (**Not significant**).
	High	Combined collision risk and distributional response impacts (OAA).	M-046	**Very low**	**Minor Adverse** (**Not significant**).

Receptor	Sensitivity or value	Activity and potential effect	Embedded environmental measures	Magnitude of effect	Assessment of residual likely significant effects
	Medium	Indirect impacts due to effects on prey species and habitats.	N/A	**Very low**	**Negligible Adverse** (**Not significant**).
Great black-backed gull	**High**	Collision risk (OAA).	M-046	**Low**	**Minor Adverse** (**Not significant**).
Herring gull	**High**	Collision risk (OAA).	M-046	**Very low**	**Minor Adverse** (**Not significant**).
Lesser black-backed gull	**High**	Collision risk (OAA).	M-046	**Very low**	**Minor Adverse** (**Not significant**).
Great skua	**Medium**	Collision risk (OAA).	M-046	**Very low**	**Minor Adverse** (**Not significant**).
Guillemot	**Medium**	Distributional responses (OAA).	N/A	**Low to Medium**	**Moderate Adverse** (**Significant**).
	Medium	Entanglement with mooring lines.	N/A	**Very low**	**Minor Adverse** (**Not significant**).
	Medium	Indirect impacts due to effects on prey species and habitats.	N/A	**Very low**	**Minor Adverse** (**Not significant**).
Razorbill	**Medium**	Distributional responses (OAA).	N/A	**Low**	**Minor Adverse** (**Not significant**).
	Medium	Entanglement with mooring lines.	N/A	**Very low**	**Minor Adverse** (**Not significant**).
	Medium	Indirect impacts due to effects on prey species and habitats.	N/A	**Very low**	**Minor Adverse** (**Not significant**).

Receptor	Sensitivity or value	Activity and potential effect	Embedded environmental measures	Magnitude of effect	Assessment of residual likely significant effects
Puffin	**Medium**	Distributional responses (OAA).	N/A	**Very low**	**Minor Adverse** (**Not significant**).
	Medium	Entanglement with mooring lines.	N/A	**Very low**	**Minor Adverse** (**Not significant**).
	Medium	Indirect impacts due to effects on prey species and habitats.	N/A	**Very low**	**Minor Adverse** (**Not significant**).
Gannet	**Medium**	Distributional responses (OAA).	N/A	**Very low**	**Minor Adverse** (**Not significant**).
	High	Collision risk (OAA).	M-046	**Very low**	**Minor Adverse** (**Not significant**).
	High	Combined collision risk and distributional response impacts (OAA).	M-046	**Very low**	**Minor Adverse** (**Not significant**).
	Medium	Entanglement with mooring lines.	N/A	**Very low**	**Minor Adverse** (**Not significant**).
Fulmar	**Low**	Distributional responses (OAA).	N/A	**Very low**	**Negligible Adverse** (**Not significant**).
Migratory species	**Low** to **high**	Distributional responses (OAA).	N/A	**Very low**	**Negligible** to **Minor** (**Not Significant**).
	High	Collision risk (OAA).	M-046	**Very low**	**Minor Adverse** (**Not significant**).

Receptor	Sensitivity or value	Activity and potential effect	Embedded environmental measures	Magnitude of effect	Assessment of residual likely significant effects
Decommissioning					
Eider	**Medium**	Direct temporary habitat loss / disturbance (offshore export cable corridor landfall).	M-056	**Very low**	**Minor Adverse** (**Not significant**).
Kittiwake	**Medium**	Indirect impacts due to effects on prey species and habitats.	N/A	**Very low**	**Minor Adverse** (**Not significant**).
Herring gull	**Low**	Direct temporary habitat loss / disturbance (offshore export cable corridor landfall).	M-056	**Very low**	**Minor Adverse** (**Not significant**).
Sandwich tern	**High**	Direct temporary habitat loss / disturbance (offshore export cable corridor landfall).	M-056	**Very low**	**Minor Adverse** (**Not significant**).
Guillemot	**Medium**	Direct temporary habitat loss / disturbance (OAA).	M-032	**Very low**	**Minor Adverse** (**Not significant**).
	Medium	Direct temporary habitat loss / disturbance (offshore export cable corridor landfall).	M-056	**Very low**	**Minor Adverse** (**Not significant**).
	Medium	Indirect impacts due to effects on prey species and habitats.	N/A	**Very low**	**Minor Adverse** (**Not significant**).
Razorbill	**Medium**	Direct temporary habitat loss / disturbance (OAA).	M-032	**Very low**	**Minor Adverse** (**Not significant**).

Receptor	Sensitivity or value	Activity and potential effect	Embedded environmental measures	Magnitude of effect	Assessment of residual likely significant effects
	Medium	Indirect impacts due to effects on prey species and habitats.	N/A	**Very low**	**Minor Adverse** (**Not significant**).
Puffin	**Medium**	Direct temporary habitat loss / disturbance (OAA).	M-032	**Very low**	**Minor Adverse** (**Not significant**).
	Medium	Indirect impacts due to effects on prey species and habitats.	N/A	**Very low**	**Minor Adverse** (**Not significant**).
Shag	**Medium**	Direct temporary habitat loss / disturbance (offshore export cable corridor landfall).	M-056	**Very low**	**Minor Adverse** (**Not significant**).

12.13 Transboundary effects

12.13.1.1 Transboundary effects arise when impacts from a development within one European Economic Area (EEA) State affects the environment of another EEA State(s). A screening of transboundary effects has been carried out and is presented in Appendix 4B of the Scoping Report (MarramWind Limited, 2023). This exercise identified the potential for transboundary effects on offshore bird populations located outside of UK territorial waters.

12.13.1.2 The assessment of offshore and intertidal ornithology for the Project has considered the potential for transboundary effects on bird populations associated with other EEA states. This is particularly relevant given the extensive foraging and migratory ranges of many seabird species, which may result in ecological connectivity beyond UK waters. Transboundary effects are predominantly considered relevant for key quantitatively assessed impacts, notably distributional responses and collision risk.

12.13.1.3 During the breeding season, connectivity with seabird colonies outside the UK is considered limited. For scoped in key receptors (identified in **Table 12.17**), no non-UK sites are identified within breeding season connectivity (based on MMFR + 1SD foraging ranges identified in Woodward *et al*., 2019), with the exception of fulmar which has a very large MMFR, though impacts on this species were of very low magnitude such that a quantitative assessment was not undertaken.

12.13.1.4 In the non-breeding season, birds are less constrained by colony location and may range more widely. However, potential transboundary impacts during this period are already accounted for through the use of Biologically Defined Minimum Population Scales (BDMPS) population sizes from Furness (2015), which incorporate appropriate proportions of birds from other EEA regions, therefore impacts on these birds are already considered for distributional responses and collision risk, with no significant effects concluded.

12.13.1.5 Based on the knowledge of the baseline environment, the nature of planned works and the wealth of evidence on the potential for impact from such projects more widely, there are not considered to be any material transboundary effects on offshore and intertidal ornithology receptors from the Project.

12.14 Inter-related effects

12.14.1.1 A description and assessment of the likely inter-related effects arising from the Project on offshore and intertidal ornithology is provided in **Chapter 32: Inter-Related Effects**.

12.15 Assessment of cumulative effects

12.15.1.1 A description and assessment of the cumulative effects arising from the Project on offshore and intertidal ornithology is provided in **Chapter 33: Cumulative Effects Assessment**.

12.16 Summary of residual likely significant effects

12.16.1.1 **Table 12.46** presents the residual likely significant effects on offshore and intertidal ornithology receptors assessed in this Chapter.

Table 12.46 Summary of assessment of residual likely significant effects for offshore and intertidal ornithology

Receptor	Sensitivity or value	Activity and potential effect	Embedded environmental measures	Magnitude of effect	Assessment of residual likely significant effects
Operation and maintenance					
Guillemot	**Medium**	Distributional responses (OAA).	N/A	**Low** to **medium**	**Moderate Adverse** (**Significant**).

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12.18 Glossary of terms and abbreviations

12.18.1 Abbreviations

Acronym	Definition
AEoI	Adverse Effect on Integrity
AOB	Apparently Occupied Burrow
AON	Apparently Occupied Nest
AOT	Apparently Occupied Territory
BCDS	Best-case Design Scenario
BOU	British Ornithologists' Union
BTO	British Trust for Ornithology
CEF	Cumulative Effects Framework
CFPS	Counterfactual of Final Population Size
CGSPS	Counterfactual of Growth Rate
CIEEM	Chartered Institute of Ecology and Environmental Management
CPGR	Counterfactual of Population Growth-Rate
CPS	Counterfactual of Population Size
CRM	Collision Risk Modelling
CV	Coefficient of Variance
DAS	Digital Aerial Survey
DEFRA	Department for Environment, Food and Rural Affairs
EC	European Commission
EEA	European Economic Area
EIA	Environmental Impact Assessment
GIS	Geographic Information System
GSD	Ground Sampling Distance
HPAI	Highly Pathogenic Avian Influenza
HRA	Habitats Regulations Appraisal
IBM	Individual Based Models
IEMA	Institute of Environmental Management and Assessment

Acronym	Definition
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effect
mCRM	Migratory Collision Risk Model
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMFR	Mean Maximum Foraging Range
MRSea	Marine Renewables Strategic Environmental Assessment
MSFD	Marine Strategy Framework Directive
NEEOG	North East and East Ornithology Group
NESBReC	North East Scotland Biodiversity Records Centre
NEWS	Non-estuarine Waterbird Surveys
NNR	National Nature Reserve
O&M	Operation and Maintenance
OAA	Option Agreement Area
ORJIP	Offshore Renewables Joint Industry Programme
OWF	Offshore Wind Farm
PINS	Planning Inspectorate
PVA	Population Viability Analysis
QA	Quality Assurance
RIAA	Report to Inform Appropriate Assessment
RSPB	Royal Society for the Protection of Birds
sCRM	Stochastic Collision Risk Model
SD	Standard Deviation
SMP	Seabird Monitoring Programme
SNCB	Statutory Nature Conservation Body
SOC	Scottish Ornithologists' Club
SPA	Special Protection Area
SPR	ScottishPower Renewables
SSSI	Site of Special Scientific Interest

Acronym	Definition
VP	Vantage Point
WCS	Worst-case Scenario
WeBS	Wetland Bird Survey
WTG	Wind Turbine Generator
ZoI	Zone of Influence

12.18.2 Glossary of terms

Term	Definition
Mitigation	Any action or process designed to avoid, prevent, reduce or, if possible, offset potentially significant adverse effects of a development.
Monitoring	Measures to ensure the systematic and ongoing collection, analysis and evaluation of data related to the implementation and performance of a development. Monitoring can be undertaken to monitor conditions in the future to verify any environmental effects identified by the EIA, the effectiveness of mitigation or enhancement measures or ensure remedial action are taken should adverse effects above a set threshold occur.
Qualifying feature	A species for which a protected site is designated due to containing a nationally or internationally important population.
Receptor	A species present in the intertidal or offshore environment which may be impacted by the Project.

MarramWind