



Sporad na Mara Offshore Wind Farm

Offshore Project

Environmental Impact Assessment Report

Chapter 14: Marine and Nearshore Ornithology,
Volume 2a

Document Reference No.: SNM-SNM-PAC-CHP-1014

Date: February 2026



Quality Control Page

| | |
|-------------------|--|
| Document details | |
| Document title | Environmental Impact Assessment Report |
| Document subtitle | Chapter 14: Marine and Nearshore Ornithology |
| Project No. | SNM-SNM-PAC-CHP-1014 |
| Date | February 2026 |
| Version | 1.0 |
| Author | NIRAS |
| Client Name | Spiorad na Mara Ltd |

Document history

| Version | Revision | Issued | Checked | Approved | Date | Comments |
|---------|----------|--------|---------|----------|---------------|----------------------|
| 1.0 | A | NIRAS | WSP | SnM Ltd | February 2026 | Final for submission |

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14 MARINE AND NEARSHORE ORNITHOLOGY

14.1 INTRODUCTION

14.1.1.1 This chapter of the Environmental Impact Assessment Report (EIAR) presents the results of the assessment of the likely significant effects (LSE) of the proposed Spiorad na Mara Offshore Wind Farm (hereafter referred to as the 'Offshore Project') with respect to Marine and Nearshore Ornithology, including seabird and waterbird species. Specifically, this chapter considers the potential impacts during the construction, operation and maintenance (O&M), and decommissioning phases.

14.1.1.2 This chapter should be read in conjunction with the project description provided in Chapter 3: Project Description, Volume 1a. It also draws upon relevant information presented in the following chapters and appendices:

- Chapter 2: Policy and Legislative Context, Volume 1a;
- Chapter 4: Consideration of Alternatives, Volume 1a;
- Chapter 5: Approach to EIA, Volume 1a;
- Chapter 11: Benthic and Intertidal Ecology, Volume 2a;
- Chapter 12: Fish Ecology, Volume 2a;
- Appendix 5.2: Response to Scoping Opinion, Volume 1c.

14.1.1.3 This technical chapter describes the following:

- Legislation, planning policy and other documentation that has informed the assessment (Section 14.2);
- Outcome of consultation and engagement that has been undertaken to date, including how matters relating to Marine and Nearshore Ornithology have been addressed (Section 14.3);
- Scope of the assessment for Marine and Nearshore Ornithology (Section 14.4);
- The methods of assessment used for baseline data gathering and impact assessment (Section 14.5);
- Environmental baseline for Marine and Nearshore Ornithological receptors (Section 14.6);
- Embedded environmental measures relevant to Marine and Nearshore Ornithology and the relevant maximum design scenario (Section 14.7);
- Assessment of Marine and Nearshore Ornithology likely significant effects and further mitigation (Section 14.8- 14.10);
- Assessment of Marine and Nearshore Ornithology Combined effects (Section 14.11);
- Assessment of Marine and Nearshore Ornithology consideration of Onshore Transmission Works Project (Section 14.12);
- Assessment of Marine and Nearshore Ornithology Cumulative effects (Section 14.13);
- Assessment of transboundary effects (Section 14.14);

- A summary of residual effects for Marine and Nearshore Ornithology (Section 14.15);
- The glossary for the Offshore Project and abbreviations used for Marine and Nearshore Ornithology (Section 14.16);
- Information sources and documentation referred to in this chapter (Section 14.17).

14.1.1.4 This chapter is supported by the following appendices and figures:

- Appendix 13.3: Digital Aerial Survey (DAS) Report, Volume 2c;
- Appendix 14.1: Ornithology Baseline Report, Volume 2c;
 - Annex 14.1.1: Apportioned Abundance Estimates Turbine Area Plus Buffers;
 - Annex 14.1.2: Unapportioned Abundance Estimate Turbine Area Plus Buffers;
 - Annex 14.1.3: Survey Distribution Figures;
 - Annex 14.1.4: MRSea Modelling Report;
 - Annex 14.1.4.A: MRSea Unapportioned and Uncorrected Abundance and Density Estimates;
 - Annex 14.1.4.B: Apportioned and Corrected Abundance and Density Estimates;
 - Annex 14.1.4.C: MRSea Model Abundance Confidence Limits and Coefficient of Variation;
 - Annex 14.1.4.D: MRSea Model Diagnostics;
 - Annex 14.1.5: Colonies in Regional Breeding Population;
- Appendix 14.2: Displacement Report, Volume 2c;
 - Annex 14.2.1: Ornithology Displacement Data;
 - Annex 14.2.2: SeabORD Report;
- Appendix 14.3: Collision Risk Modelling Report, Volume 2c;
 - Annex 14.3.1: Deterministic Collision Risk Estimates;
- Appendix 14.4: Migratory Collision Risk Modelling Report, Volume 2c;
 - Annex 14.4.1: Species-Specific Inputs For Migratory Waterbirds;
- Appendix 14.5: EIA Population Viability Analysis Report, Volume 2c;
- Appendix 14.6: EIA Ornithology Consultation, Volume 2c;
- Figure 14.1: Offshore Ornithology Study Areas, Volume 2b;
- Figure 14.2: Location of Projects / Plans Screened into the Cumulative Effects Assessment for Offshore Ornithology, Volume 2b.

14.1.1.5 The Marine and Nearshore Ornithology chapter considers any birds that are present at some point in their life cycle in the Study Area (defined in Section 14.4.2). This includes seabird species that occur regularly in the Study Area, and also waterbirds and other bird species using the Study Area periodically, e.g. during bi-annual migratory flights. The overarching term 'seabird' is used to refer to species that depend on the marine environment for survival at some point in their life cycle. Therefore, in addition to the true seabirds, consideration is given to seaducks, divers and grebes

where applicable because of their additional reliance on marine areas, especially in the non-breeding season.

14.2 SUMMARY OF POLICY AND LEGISLATIVE CONTEXT

14.2.1.1 This section outlines the legislation, policy, and guidance that is relevant to the assessment of likely significant effects on Marine and Nearshore Ornithology associated with the construction, O&M, and decommissioning of the Offshore Project. In addition, other national, regional, and local policies are considered within this assessment where they are judged to be relevant. Further information on policies relevant to the EIAR is provided in Chapter 2, Volume 1a.

14.2.1.2 A summary of the legislative and policy relevant to Marine and Nearshore Ornithology is provided in Table 14.1.

Table 14.1: Legislation and policy in relation to Marine and Nearshore Ornithology

| Title | Relevance to Marine and Nearshore Ornithology |
|--|--|
| National Legislation/ Policy | |
| The Habitats Regulations: The Conservation of Offshore Marine Habitats and Species Regulations 2017. The Conservation of Habitats and Species Regulations 2017. The Conservation of Habitats and Species (Amendment) (European Union (EU) Exit) Regulations 2019. | The Habitats Regulations require that where a plan or project that is not directly connected with or necessary to the management of a European site but is likely to have a significant effect on a European site (either individually or in combination with other plans or projects), it shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. LSE on ornithology features of European sites are considered from an EIA perspective within this report. Assessment of the LSE (in Habitat Regulations Appraisal (HRA) terms) on the qualifying interest features of Special Protection Areas (SPAs), together with assessment on other Natura sites and qualifying interest features (e.g. Special Areas of Conservation (SAC)) from a habitats perspective are provided in the Offshore Report to Inform Appropriate Assessment (Offshore RIAA). |
| The Nature Conservation (Scotland) Act 2004 (as amended) | The Act sets out a series of measures which are designed to conserve biodiversity and to protect and enhance the biological and geological natural heritage of Scotland/ <i>Alba</i> . This EIAR as a whole demonstrates that the Offshore Project will comply with the Act and provides information to public bodies and office holders to enable them to fulfil their obligations under the Act. |
| Wildlife and Natural Environment (Scotland) Act 2011 | The Act makes amendments to the 1981 Act (below) which concern the management of Sites of Specific Scientific Interests (SSSIs) and the enforcement of wildlife crime. |

| Title | Relevance to Marine and Nearshore Ornithology |
|---|--|
| The Wildlife and Countryside Act 1981 (as amended) | The primary legislation protecting animals, plants and certain habitats in the United Kingdom (UK), including all wild birds and their nests, eggs and chicks. This EIAR as a whole demonstrates that the Offshore Project will comply with the Act and provides information to public bodies and office holders to enable them to fulfil their obligations under the Act. |
| EIA Regulations: The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017. The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017. | The Environmental Impact Assessment (EIA) Regulations set out when EIAs are required and the procedures for carrying out and reporting of EIAs. It is noted that the Offshore Project does meet the criteria for carrying out an EIA, and this EIAR is therefore set out to meet the requirements of the Regulations. |
| Scottish National Marine Plan (2015): <i>Section 11, Part 1: Objectives and Marine Planning Policies</i> Sustainable development of offshore wind, wave and tidal renewable energy in the most suitable locations. | The choice of location for the Offshore Project is discussed in Chapter 3, Volume 1a. |
| Scottish National Marine Plan (2015): <i>Policy GEN 9 Natural Heritage</i> Development and use of the marine environment must: (a) Comply with legal requirements for protected areas and protected species. (b) Not result in significant impact on the national status of Priority Marine Features. (c) Protect and, where appropriate, enhance the health of the marine area. | This EIAR sets out how the Offshore Project will comply with all relevant legal requirements. No ornithological features are classified as Priority Marine Features and so they are not discussed further in this chapter but may be considered in other chapters as necessary. Measures taken to protect the marine area relevant to ornithology are set out in Section 14.7.2. |
| Scottish National Marine Plan (2015): <i>Living within Environmental Limits</i> A strategic approach to mitigating potential impacts and cumulative impacts on the marine environment forms an integral part of marine planning and decision making, whilst issues arising in the coastal interface should align between marine and terrestrial processes. | A Cumulative Effect Assessment (CEA) has been undertaken and is outlined in Section 14.13 which can be used to inform the Scottish Government's strategic approach to planning and decision making. |
| Draft Updated Sectoral Marine Plan for Offshore Wind Energy (Scottish Government, 2025): The Plan aims to identify sustainable plan options for the future development of | The Offshore Project is located within the N4 Plan Option. The location of the Array Area has therefore been informed by the Plan Development Process. |

| Title | Relevance to Marine and Nearshore Ornithology |
|--|---|
| commercial-scale offshore wind energy in Scotland/ <i>Alba</i> . | |
| Draft Updated Sectoral Marine Plan for Offshore Wind Energy (Scottish Government, 2025): Within the East region a key pathway of concern relates to effects on bird populations, due to potential cumulative/in-combination impacts resulting from collision risk and displacement for key seabird species. | The potential impact on bird populations from the Offshore Project alone and cumulatively/in-combination with other projects is assessed in this report and the accompanying Offshore RIAA. |

14.3 SCOPING AND CONSULTATION

14.3.1 OVERVIEW

14.3.1.1 This section describes the stakeholder engagement undertaken for the Offshore Project. This consists of early engagement; the outcome of, and response to, the Scoping Opinion in relation to the Marine and Nearshore Ornithology assessment; informal consultation; and consultation undertaken through the Preliminary Application Consultation (PAC) process (hereafter referred to as the 'formal consultation'). An overview of engagement undertaken for the Offshore Project as a whole can be found in Chapter 5, Volume 1a and Appendix 5.4: Stakeholder Consultation and Engagement, Volume 1c.

14.3.1.2 Consultation is a key feature of the EIA process and continues throughout the lifecycle of the Offshore Project, from the initial stages through to consent and post consent.

14.3.1.3 Consultation captures all consultation and engagement and has been ongoing with a number of prescribed and non-prescribed consultation bodies and local authorities in relation to Marine and Nearshore Ornithology. All consultation to date has been undertaken in line with the process described in Chapter 5, Volume 1a and Appendix 5.4, Volume 1d. Feedback received during this process has been incorporated into the EIAR wherever possible as appropriate.

14.3.2 EARLY ENGAGEMENT

14.3.2.1 Early engagement was undertaken with a number of consultation bodies in relation to Marine and Nearshore Ornithology. This engagement was undertaken to introduce the Offshore Project and the proposed approach to scoping the EIAR. In accordance with the Marine Directorate Licensing Operations Team (MD-LOT) guidance, the Applicant held formal scoping workshops with the Marine Directorate, NatureScot, and Comhairle nan Eilean Siar in June 2023 to inform the Scoping Report. Further details of the consultation undertaken and the post-workshop feedback can be found in Section 5.3 and Table 5.3-1 of the Scoping Report.

Scoping Opinion

14.3.2.2 Sporad na Mara Limited (hereafter referred to as the 'Applicant') submitted a Scoping Report (Sporad na Mara Limited, 2023) and request for a Scoping Opinion to MD-LOT in September 2023. A Scoping Opinion was received in May 2024. The Scoping Report sets out the proposed Marine and Nearshore Ornithology assessment methodologies, an outline of the baseline data collected to date and proposed, and the scope of the assessment. The comments received in the Scoping Opinion and how these have been addressed in this EIAR is provided in Appendix 5.2, Volume 1c. A summary of those responses relevant to Marine and Nearshore Ornithology is provided in Appendix 14.6, Volume 2c. Regard has also been given to other stakeholder comments that were received in relation to the Scoping Report.

14.3.3 POST-SCOPING CONSULTATION

14.3.3.1 Appendix 14.6, Volume 2c presents the key consultation and engagement events that have occurred up to October 2025 with a number of statutory and non-statutory consultation bodies in relation to Marine and Nearshore Ornithology. Appendix 14.6, Volume 2c specifically includes NatureScot, MD-LOT, RSPB Scotland, RSPB Outer Hebrides and National Trust of Scotland as the key consultees for Marine and Nearshore Ornithology. All consultation to date has been undertaken in line with the process described in Chapter 5, Volume 1a. Feedback received during this process has been incorporated into the EIAR wherever possible, as appropriate. The Applicant is still in regular consultation with consultees and will continue to communicate throughout the Project's application.

14.3.3.2 Details of the key points raised and the Applicant's summary of responses to these key consultees is presented within Appendix 14.6, Volume 2c.

14.3.3.3 All consultation undertaken in relation to the Report to Inform Appropriate Assessment (RIAA) is presented in Appendix C of the Offshore RIAA.

14.4 SCOPE OF THE ASSESSMENT

14.4.1 OVERVIEW

14.4.1.1 This section sets out the scope of the EIA assessment for Marine and Nearshore Ornithology. This scope has been developed as the Offshore Project design has evolved and responds to feedback received to date, as set out in Section 14.3.

14.4.2 SPATIAL SCOPE AND STUDY AREAS

14.4.2.1 Within the Offshore Project assessment presented within this chapter, several different spatial areas have been considered depending on the impact pathway being assessed. These areas include;

- Array Area: Total area within which offshore wind turbines, associated foundations, Array Cables and Offshore Substation Platform (OSP) (if required under Scenario 1– see Section 3.3.2 of Chapter 3, Volume 1a) will be located.
- Turbine Area: this area relates to a reduced area within the Array Area where above water surface infrastructure would be located i.e. wind turbines or OSP (if required). Developed and refined through environmental assessment.
- Turbine Area plus a 2 km buffer: the area used to assess distributional responses for all species except divers, in accordance with NatureScot guidance (NatureScot, 2023f).
- Turbine Area plus a 4 km buffer: this area is also known as ‘the Study Area’ and relates to the area around the Turbine Area up to Mean High Water Springs (MHWS) (i.e. excluding any land within 4 km of the Turbine Area). This area was included in the assessment to account for potential disturbance and displacement impacts, with the 4 km buffer agreed in consultation with NatureScot for diver species (see rows regarding consultation on 2 June 2025 within Appendix 14.6, Volume 2c).
- Survey Area: is defined as the Array Area plus a 10 km buffer, up to MHWS (i.e. excluding any land within 10 km of the Array Area). The Offshore Cable Area of Search (OCAS) is entirely within the Survey Area. NatureScot considered this area appropriate as agreed in consultation, as the 10 km buffer around the Array Area reflects the scale of the development and helps minimise potential edge effects (see rows regarding consultation on 3 April 2025 within Appendix 14.6, Volume 2c).
- Offshore Project Boundary: This area relates to the Area Array plus the OCAS; the area is used within the assessment of impacts which occur over these 2 areas (e.g. distributional responses and habitat loss).
- Marine Fish Study Area: This area is shown in Figure 12.1, Volume 2b and is used when assessing the indirect impacts on prey resources as this is the area used in the assessment of impacts on fish within Chapter 12, Volume 2a.

- 14.4.2.2 Most of the areas used within this chapter are shown in Figure 14.1, Volume 2b. The Offshore Project Boundary does not appear as a single listed area but is represented by its individual components, which include the Array Area and the OCAS.
- 14.4.2.3 In addition, it is important to consider that ornithological receptors are highly mobile, travelling potentially long distances whilst foraging and on migration. As such, the Offshore Project has the potential to impact seabird populations over a much wider region. Consideration has therefore also been given to regional populations of seabirds that may have connectivity to the Offshore Project.
- 14.4.2.4 The geographic spread of these regional populations varies according to biological connectivity, which differs between species and seasons, as detailed in Appendix 14.1, Volume 2c. The regional Zone of Influence (Zol) is therefore not a single, defined area, but a dynamic area over which the Offshore Project's impacts may be felt according to the species and time of year.
- 14.4.2.5 In the breeding season, the regional Zol is defined as the area within the site and species-specific foraging range recommended by NatureScot (2023b). For most species, this is the species' mean-max + 1 Standard Deviation (SD) foraging range, as taken from Woodward *et al.* (2019), but in some cases the recommended foraging range has been adjusted to take into account site-specific evidence.
- 14.4.2.6 Outside of the breeding season, for most species the regional Zol is defined as the season- and species-specific Biologically Defined Minimum Population Scales (BDMPS) region as described in Furness (2015). However, in line with NatureScot guidance (2023c), a different Zol is applied to common guillemot *Uria aalge* (hereafter 'guillemot'). For this species, the Zol is defined as the same region as per the breeding season, on the basis of tracking data that indicates birds remain within the general vicinity of their breeding colonies. It should, however, be noted that the population present within the Zol may differ between seasons (even if the Zol itself is the same) as the result of different population structures (e.g. during the breeding season, prior to which fledging juvenile chicks will not be present at sea) and the potential for an influx of birds breeding outside the Zol.

14.4.3 TEMPORAL SCOPE

- 14.4.3.1 The temporal scope of the assessment of Marine and Nearshore Ornithology is the entire lifetime of the Offshore Project, which therefore covers the construction, O&M, and decommissioning phases.
- 14.4.3.2 Construction is scheduled to begin in 2028/2029 and is expected to take 5 years, with the Offshore Project becoming fully operational in 2032/2033. Construction activities for the Offshore Project will take place between April - October each year. The anticipated operational lifespan of the Project is up to 35 years.

14.4.4 POTENTIAL RECEPTORS

Valued Ornithological Receptors

14.4.4.1 The spatial and temporal scope of the assessment enables the identification of receptors which may experience a change as a result of the Offshore Project.

14.4.4.2 The Baseline Characterisation Report (Appendix 14.1, Volume 2c) identifies 13 Valued Ornithological Receptors (VORs), which are determined to be the key receptors requiring the most consideration within this EIAR due to a combination of the species' recorded occurrence in the site-specific DAS, the species' sensitivity, and the species' vulnerability to the potential effects of the Offshore Project.

14.4.4.3 Further details on the criteria for identifying VORs are given in Appendix 14.1, Volume 2c. The VORs for Marine and Nearshore Ornithology that may experience likely significant effects are listed in Table 14.2.

Table 14.2: VORs requiring assessment for Marine and Nearshore Ornithology

| VORs identified in Appendix 14.1, Volume 2c | Scientific name |
|--|---------------------------|
| Black legged kittiwake (hereafter 'kittiwake') | <i>Rissa tridactyla</i> |
| Great black-backed gull | <i>Larus marinus</i> |
| Herring gull | <i>Larus argentatus</i> |
| Arctic tern | <i>Sterna paradisaea</i> |
| Black guillemot | <i>Cephus grylle</i> |
| Guillemot | <i>Uria aalge</i> |
| Razorbill | <i>Alca torda</i> |
| Atlantic puffin (hereafter 'puffin') | <i>Fratercula arctica</i> |
| Red-throated diver | <i>Gavia stellata</i> |
| Great northern diver | <i>Gavia immer</i> |
| Northern fulmar (hereafter 'fulmar') | <i>Fulmarus glacialis</i> |
| Manx shearwater | <i>Puffinus puffinus</i> |
| Northern gannet (hereafter 'gannet') | <i>Morus bassanus</i> |

14.4.4.4 Following consultation with NatureScot (see rows regarding consultation on 2 June 2025 within Appendix 14.6, Volume 2c), it was agreed that even though black guillemot is considered a VOR within Appendix 14.1, Volume 2c it does not require assessment within this EIAR due to not being susceptible to distributional or collision impacts.

Migratory birds

Migratory seabirds

14.4.4.5 It is acknowledged that not all receptors with a potential for significant environmental effects, and therefore requiring consideration within this EIAR, will be identified as VORs. In particular, VORs are limited to species for which the DAS data is considered sufficient to characterise their presence

within the Study Area. However, DAS may not adequately capture all species, particularly migratory seabirds such as petrels and skuas.

14.4.4.6 To address this limitation, additional assessment has been undertaken using migratory collision risk modelling (mCRM) (see Appendix 14.4, Volume 2c and paragraphs 14.9.2.71 to 14.9.2.80). Further consideration has also been given to the potential impacts of artificial lighting, especially for nocturnal or crepuscular species such as petrels (see Sections 14.8.4, 14.9.7, and 14.10.4). The migratory seabird species considered within this chapter are:

- Little gull *Hydrocoloeus minutus*;
- Sandwich tern *Thalasseus sandvicensis*;
- Little tern *Sternula albifrons*;
- Common tern *Sterna hirundo*;
- Arctic tern *Sterna paradisaea*;
- Arctic skua *Stercorarius parasiticus*;
- Great skua *Stercorarius skua*;
- Pomarine skua *Stercorarius pomarinus*;
- Long-tailed skua *Stercorarius longicaudus*;
- European storm petrel *Hydrobates pelagicus* (hereafter 'storm petrel');
- Leach's storm petrel *Hydrobates leucorhous* (hereafter 'Leach's petrel').

Migratory waterbirds

14.4.4.7 Similarly, migratory waterbirds may not be adequately represented in DAS data, particularly due to their movement patterns and seasonal timing. Migratory waterbirds is used broadly and includes some terrestrial species known to migrate across waters (e.g. some species of raptor and owl), however, to keep the terminology simple 'migratory waterbirds' has been used within this chapter. Although these species are not classified as VORs, they are still considered within the assessment where a potential for significant environmental effects is identified. To evaluate potential impacts on these species, mCRM has been undertaken (see Appendix 14.4, Volume 2c and paragraphs 14.9.2.75 to 14.9.2.80). Additionally, the potential influence of artificial lighting on migratory waterbirds has been considered where relevant (see Sections 14.8.4, 14.9.7, and 14.10.4). A total of 69 migratory waterbird species have been considered within this chapter. The full list of these migratory waterbird species is provided in Section 2.1.3 of Appendix 14.4, Volume 2c.

14.4.5 POTENTIAL EFFECTS

14.4.5.1 The impacts scoped in for the Offshore Project that may result in potential effects on Marine and Nearshore Ornithology receptors (as set out in Marine and Nearshore Ornithology Scoping Report (Sporad na Mara Limited, 2023)) have been agreed with the relevant consultees through the scoping process. As detailed in Appendix 14.6, Volume 2c, no concerns were raised regarding the

impacts proposed to be scoped in or out. A summary of the impacts taken forward for assessment is provided in Table 14.3.

Table 14.3: Impacts scoped into the assessment for Marine and Nearshore Ornithology

| Receptor | Impact | Justification | Assessment Method |
|--|--|---|--|
| Construction and Decommissioning | | | |
| All VORs in Table 14.2 | Temporary habitat loss and disturbance | The indirect impact on Marine and Nearshore Ornithology receptors due to direct loss/disturbance of the habitat. Temporary loss or disturbance to habitats from activities such as seabed preparation, drilling, and cable installation or removal may affect the availability and quality of foraging habitat, particularly for diving bird species. These effects can reduce access to suitable foraging, nesting, and resting areas and may lead to additional energetic costs for affected birds. | Habitat loss will be assessed through a desk-based analysis of seabird foraging areas and their overlap with the Offshore Project activities. The assessment will also be informed by existing literature and reviews on seabird sensitivity loss of habitat and supplemented by project-specific survey data where available. |
| All VORs in Table 14.2 | Indirect effects through effects on prey species | Changes in prey availability, through physical impacts on prey species and their associated habitat, may have energetic impacts on birds that forage within the Marine Fish Study Area (see Figure 12.1, Volume 2b). | Desk-based assessment of impacts to prey items (e.g. benthic ecology, benthic invertebrates (which includes shellfish) and fish and receptors), largely informed by outcomes of the benthic ecology (see Chapter 11, Volume 2a) and fish impact assessments (see Chapter 12, Volume 2a). |
| <ul style="list-style-type: none"> • Fulmar; • Manx shearwater; • Storm petrel; and • Leach's petrel | Response to artificial lighting | Several species are known to respond to artificial lighting from vessels; however, the magnitude of the consequences is largely unquantified. Studies have shown differing responses to different sources/types of lighting, | Desk-based review of recent studies and research on the impacts of artificial light, incorporating both regional and site-specific data. |

| Receptor | Impact | Justification | Assessment Method |
|--|----------------|---|---|
| | | and differing responses in adult and juvenile individuals. | |
| O&M | | | |
| <ul style="list-style-type: none"> • Kittiwake; • Great black-backed gull; • Herring gull; • Arctic tern; • Fulmar; • Manx shearwater; • Gannet; • Migratory birds (seabirds and waterbirds) | Collision risk | Rotating turbine blades introduce a potential for in-air collision. Such collisions can result in injury and in some cases mortality. | <p>Assessment was undertaken using site-specific abundance data and generic flight height data, which were input into the stochastic Collision Risk Model (sCRM) Tool (Caneco <i>et al.</i>, 2022), along with parameters recommended by NatureScot (2025b). Appendix 14.3 and 14.4, Volume 2c provided full details of the methodologies used for assessing collision risk.</p> <p>For migratory seabird species, data from WWT Consulting and MacArthur Green (2014) were used to inform the Band (2012) collision risk model (CRM). For migratory waterbird species, the stochastic migratory CRM shiny app developed by HiDef Aerial Surveying for Marine Scotland Science (HiDef, 2022) was used, drawing on information from Woodward <i>et al.</i> (2023).</p> |

| Receptor | Impact | Justification | Assessment Method |
|--|--|---|---|
| <ul style="list-style-type: none"> • Kittiwake¹; • Guillemot; • Razorbill; • Puffin; • Red-throated diver; • Great northern diver; • Gannet. | Distributional responses (displacement) associated with the Offshore Project | Birds may be displaced from the Offshore Project Boundary and surrounding area through avoidance. This can restrict access to important foraging, resting, and nesting areas. | <p>Assessment was undertaken using site-specific abundance data and applying the displacement matrix approach (see Appendix 14.2, Volume 2c and Annex 14.2.1, Volume 2c). Input parameters were aligned with guidance provided by NatureScot (2023f) and the Statutory Nature Conservation Bodies (SNCBs) (JNCC <i>et al.</i>, 2022 a, b).</p> <p>The Applicant has also presented an assessment of the consequences of displacement using the SeaBORD model in Annex 14.2.2, Volume 2c.</p> <p>However, due to the limitations of the SeabORD model (as detailed in Annex 14.2.2, Volume 2c), the results are considered to provide valuable contextual information, but quantitative assessment within this EIAR relies on the results of the matrix approach to displacement assessment.</p> |
| <ul style="list-style-type: none"> • Fulmar; • Migratory birds (seabirds and waterbirds) | Barrier effects | Avoidance of the Turbine Area can lead to barrier effects, where individuals are required to change flight route to access feeding grounds or migration pathways. | Desk-based assessment, informed by relevant literature and studies for seabirds and migratory birds. |

¹ Despite this species having a low sensitivity to disturbance and displacement as shown within Wade *et al.* (2016) and Bradbury *et al.* (2014), NatureScot request that this species is considered for these impacts (NatureScot, 2023f) due to the uncertainty around how this species behaviours in the presence of offshore structures and activities.

| Receptor | Impact | Justification | Assessment Method |
|---|--|---|---|
| | | Particularly important for individuals moving to and from breeding colonies or migrating. NatureScot comments see rows regarding the consultation on 16 April 2025 within Appendix 14.6, Volume 2c restricted the assessment to fulmar. | |
| All VORs in Table 14.2 | Long-term habitat loss (i.e. duration of the project). | Physical presence of Offshore Project infrastructure, airborne noise from maintenance activities, and underwater noise from vibration of operating wind turbines can displace birds from the Offshore Project Boundary. This can reduce the amount of available foraging, nesting, and resting habitat. It should be noted that infrastructure can provide a new roosting habitat for some species. | Habitat loss is largely addressed through the assessment of distributional responses, which considers the displacement of birds from potential foraging areas. However, this approach does not account for impacts on species that are not sensitive to displacement, or on areas located outside the Offshore Project Boundary. Habitat loss beyond the Offshore Project Boundary will therefore be assessed through a desk-based study, identifying seabird and intertidal bird foraging areas and evaluating their overlap with the Offshore Project activities. |
| <ul style="list-style-type: none"> • Fulmar; • Manx shearwater; • Storm petrel; • Leach's petrel. | Response to artificial lighting | Several species are known to respond to artificial lighting from offshore structures and vessels; however, the magnitude of the consequences is largely unquantified. Studies have shown differing responses to different sources/types of lighting, and differing responses in adult and juvenile individuals. | Desk-based study of recent studies and research on the impacts of artificial light, incorporating both regional and site-specific data. |

14.4.6 ACTIVITIES OR IMPACTS SCOPED OUT OF ASSESSMENT

14.4.6.1 The Marine and Nearshore Ornithology Scoping Report (Spiorad na Mara Limited, 2023) set out the impacts proposed to be scoped out of the assessment for Marine and Nearshore Ornithology. As shown in Appendix 14.6, Volume 2c, no concerns were raised by key consultees regarding these scoped-out impacts in the Offshore Project Scoping Opinion (MD-LOT, 2024).

14.4.6.2 These impacts are outlined, together with justification for scoping them out, in Table 14.4.

Table 14.4: Impacts scoped out of assessment for Marine and Nearshore Ornithology

| Impact | Justification |
|--|---|
| Construction and Decommissioning | |
| Collision Risk | The risk of collision with wind turbines is highest during the operational phase when all wind turbines are present and operational. The risk of collision with static structures such as jack-up vessels is negligible and therefore collision risk during the construction and decommissioning phases has been scoped out. |
| Distributional Responses (Displacement) associated with the Offshore Project | The impacts of both disturbance and displacement, are expected to be greatest during the operational phase when all wind turbines are in situ and maintenance activities are ongoing. In contrast, impacts during the construction and decommissioning phases are anticipated to be significantly lower and have therefore been scoped out. For disturbance and displacement, these impacts during the construction and decommissioning phases are instead considered under temporary habitat loss and disturbance. |
| Barrier effects | The impact of barrier to movement is expected to be greatest during the operational phase when all wind turbines are in situ and maintenance activities are ongoing. In contrast, impacts during the construction and decommissioning phases are anticipated to be significantly lower and have therefore been scoped out. |
| Long-term habitat loss (i.e., duration of the Offshore Project) | Impacts to supporting habitat may occur during the construction phase; however, these are considered short-term in nature (i.e., limited to the duration of construction activities). While longer-term impacts, such as those associated with permanent infrastructure, may commence during construction, they are considered to extend throughout the lifetime of the Offshore Project and are therefore assessed under the O&M phase. |
| Entanglement | Mooring lines associated with construction vessel activity and ghost fishing gear that becomes caught in the infrastructure could present an entanglement risk. However, any vessel moorings during the construction phase will be temporary, and mooring lines will be maintained taught with no ability to form loops. Likewise, any mooring lines are unlikely to collect ghost fishing gear as they will be in place only temporarily. The effect is therefore scoped out. |

| Impact | Justification |
|--|---|
| Accidental pollution | Accidental pollutant spills from equipment and vessels associated with construction and decommissioning activities could negatively impact seabird species and their prey that have connectivity to the Offshore Project Boundary. However, the implementation of an Outline Offshore Environmental Management Plan, Volume 3 (OEMP), which complies with requirements and best practices in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL) and Shipboard Oil Pollution Emergency Plans (SOPEPs), will reduce the likelihood of such events and help minimise any associated impacts. Therefore, this impact has been scoped out. |
| O&M | |
| Temporary habitat loss and disturbance | This impact is only applicable in the construction and decommissioning phases and is scoped out of the operational phase. O&M activities will typically be confined to the existing Turbine Area footprint and won't lead to temporary habitat loss. Operational disturbance is covered by the impact: <i>Distributional Responses (Displacement) associated with the Offshore Project</i> . |
| Indirect effects through effects on prey species | This impact is considered relevant only during the construction and decommissioning phases. It has been scoped out of the operational phase, as indirect effects on seabirds via changes in prey availability are considered negligible. This is due to the limited spatial extent and low intensity of operational activities, such as routine maintenance, which are unlikely to result in measurable changes to prey populations or distribution. |
| Entanglement | Mooring lines associated with O&M vessel activity and ghost fishing gear that becomes caught in the infrastructure could present an entanglement risk. However, any vessel moorings during the O&M phase will be temporary, and mooring lines will be maintained taught with no ability to form loops. Likewise, any mooring lines are unlikely to collect ghost fishing gear as they will be in place only temporarily. As all wind turbines will be fixed base, there will be no mooring lines associated with wind turbines. The effect is therefore scoped out. |
| Accidental pollution | Accidental pollutant spills from equipment and vessels associated with O&M activities could negatively impact seabird species and their prey that have connectivity to the Offshore Project Boundary. However, the implementation of a OOEMP, which complies with requirements and best practices in accordance with MARPOL and SOPEPs, will reduce the likelihood of such events and help minimise any associated impacts. Therefore, this impact has been scoped out. |

14.5 METHODOLOGY FOR BASELINE DATA GATHERING AND IMPACT ASSESSMENT

14.5.1 METHODOLOGY FOR BASELINE DATA GATHERING

Overview

14.5.1.1 A desk-based study and site-specific surveys have been undertaken to characterise the Marine and Nearshore Ornithology baseline. The spatial scale over which the study and surveys have been undertaken focus on providing contextual data on the which birds are likely to be foraging, roosting, loafing or migratory through the area which could be impacted by the Offshore Project. Impacts to birds can occur over different spatial scales, dependent on what impact is being assessed.

14.5.1.2 The desk-based study reviews existing literature which covers a much larger spatial scale than the site-specific surveys are able to (for example some of the data covers the whole of the UK, e.g. the Seabird Count data (Burnell *et al.*, 2024)). The site-specific surveys were undertaken over the Survey Area, which is described within Section 14.4.2. This Survey Area can be further divided into additional areas of smaller spatial scale, these are:

- the Study Area;
- the Array Area;
- the Turbine Area; and
- Offshore Project Boundary

14.5.1.3 The baseline characterisation presented in Section 14.6.1 summarise the data currently available for these areas. Full baseline characterisation is provided in Appendix 14.1, Volume 2c.

Desk study

14.5.1.4 Information on Marine and Nearshore Ornithology within the Study Area and Zol (as described in Section 14.4.2) was collected through a detailed desk-based study of existing studies and datasets which are summarised in Table 14.5. The sources summarised in Table 14.5 have been used for additional context and background information to inform the baseline environment. It is noted that several of these sources are dated or distanced from the Offshore Project and therefore are not appropriate for use in quantitative assessment. Table 14.5 is sorted presented alphabetically using 'Source' column and not weighted for their relevance or importance.

Table 14.5 Data sources used to inform the Marine and Nearshore Ornithology EIAR

| Source | Date of Data | Summary | Spatial Coverage |
|---|--------------|--|-----------------------|
| A review to inform the assessment of the risk of collision and displacement in petrels and shearwaters from | 2022 | Review of data quantity and quality within Scotland/ <i>Alba</i> on light attraction for Manx shearwater and petrel species. | Scotland/ <i>Alba</i> |

| Source | Date of Data | Summary | Spatial Coverage |
|--|-----------------------|---|---|
| offshore wind developments in Scotland/ <i>Alba</i> (Deakin <i>et al.</i> , 2022) | | | |
| Britain & Ireland Seabirds Count – the fourth Breeding Seabird Census (Burnell <i>et al.</i> , 2023) | 2015-2021 | Colony counts of 25 seabird species surveyed within Britain & Ireland. | UK |
| Desk-based revision of seabird foraging ranges used for HRA screening (Woodward <i>et al.</i> , 2019) | 2019 | Species-specific foraging ranges derived from published literature for UK breeding seabirds. | UK |
| Distribution maps of cetacean and seabird populations in the North-East Atlantic (Waggitt <i>et al.</i> , 2020) | 2020 | Species Distribution Model (SDM) maps showing predicted densities of seabirds (including key species kittiwake, puffin, guillemot, fulmar, storm-petrel, great skua, gannet, and razorbill) around the British Isles. | UK |
| EURING Migration Atlas (Spina <i>et al.</i> , 2022) | 2023 | Online atlas of interactive maps detailing the migratory movements of 300 species. The collated data is gathered using ringing and other tracking devices. Includes variables from age of individuals to seasonal patterns. | Flyways between Eurasia and Africa |
| European Seabirds at Sea (ESAS) (ICES, 2022) | >1991 | Offshore monitoring data of seabirds (and marine mammals) collected during aerial or ship-based surveys. | UK |
| Interspecific variation in non-breeding aggregation: a multi-colony tracking study of 2 sympatric seabirds (Buckingham <i>et al.</i> , 2022) | 2017 - 2019 | Population distributions of guillemot and razorbill and compared population aggregation during key periods of the non-breeding season (post-breeding moult and mid-winter). | UK |
| Lewis Tidal Array Environmental Statement (ES) (Aquamarine Power and Royal Haskoning, 2012) | September 2010 - 2012 | Survey data of seabirds (and marine mammals) collected through monthly DAS surveys of the proposed (but not yet constructed) Lewis Tidal Array. | Site specific data of the Lewis Tidal Array plus a 10 km buffer |

| Source | Date of Data | Summary | Spatial Coverage |
|---|--------------------------|---|--|
| National Biodiversity Network (NBN) Atlas | 2022 | Collaborative project that aggregates biodiversity data, including ornithology, for public access. | UK |
| Natural Research Ltd white-tailed eagle satellite telemetry data | June 2020 - January 2025 | Global Positioning System (GPS) tracking data from 4 white-tailed eagles tagged as chicks on Lewis/ <i>Eilean Leòdhais</i> . | Data was supplied consisting of all tracked points within a bespoke area of interest, which includes the entire Offshore Project Boundary. |
| NatureScot Avian Influenza summer 2023 update (NatureScot, 2023i) | 2023 | Outcome of the impact of avian flu on Scotland's seabird populations during the summer of 2023. | Scotland/ <i>Alba</i> |
| NatureScot Scientific Advisory Committee Sub-Group on Avian Influenza Report on the H5N1 outbreak in wild birds 2020 - 2023 (NatureScot, 2023j) | 2020 - 2023 | An assessment of the current and emerging impact and knowledge base of Highly Pathogenic Avian Influenza (HPAI) on wild bird populations in Scotland/ <i>Alba</i> . | UK |
| Non-breeding season populations of seabirds in UK waters: Population sizes for BDMPS (Furness, 2015) | 2015 | Report for Natural England to define species-specific non-breeding season seabird populations. | UK and Ireland |
| Royal Society for the Protection of Birds (RSPB) Future of the Atlantic Marine Environment (FAME) and Seabird Tracking and Research (STAR) Survey Data (Cleasby <i>et al.</i> , 2018) | 2010-2015 | GPS tagging data collected between 2010-2014 at UK breeding colonies for fulmar, European shag <i>Gulosus aristotelis</i> , kittiwake, guillemot, and razorbill. | UK and Ireland |
| Seabird 2000 Census (Mitchell <i>et al.</i> , 2004) | 1998-2002 | Distribution maps and regional population estimates for 25 seabird species from surveys executed between 1998-2002. | UK |
| Seabird Monitoring Programme (SMP) Database (JNCC <i>et al.</i> , 2024) | 1986 - 2024 | Colony data to determine seabird sites with potential connectivity and information on colony productivity. | UK and Ireland |
| Spaceport 1 Environmental Statement (AquaTerra, 2021) | April 2019- March 2021 | Seabird survey data specific to the Spaceport 1 site on the northwest coast of Uist/ <i>Uibhist</i> . Data were collected through | Northwest Uist/ <i>Uibhist</i> , including terrestrial, coastal, and partial marine coverage |

| Source | Date of Data | Summary | Spatial Coverage |
|---|--------------|---|-----------------------|
| | | monthly observations of birds and site walk over surveys. | |
| Strategic assessment of collision risk of Scottish offshore wind farms to migrating birds (WWT Consulting and MacArthur Green, 2014) | 2014 | Information on migratory seabird species to inform migratory seabird assessments. | Scotland/ <i>Alba</i> |
| Strategic study of collision risk for birds on migration and further development of the sCRM tool (Work Package 1: Strategic review of birds on migration in Scottish waters) (Woodward <i>et al.</i> , 2023) | 2023 | Information on 70 migratory bird flyways and their associated population estimates to be used in migratory waterbird assessments. | UK |
| UK seabird colony counts in 2023 following the 2021-22 outbreak of Highly Pathogenic Avian Influenza (Tremlett <i>et al.</i> , 2024) | 2023 | Trends in colony counts of target seabird species affected by HPAI, compared to 2015-2021 Seabirds Count. | UK |

Identification of designated sites

14.5.1.5 All designated sites within the Marine and Nearshore Ornithology Study Area and ZoI (as described in Section 14.4.2) that could be affected by the construction, O&M, and/or decommissioning phases of the Offshore Project were identified. The criteria for identification are described below:

- All designated sites of international, national, and local importance that directly overlap with the Study Area or have connectivity/are within the Marine and Nearshore Ornithology ZoI (as set out in Section 14.4.2) were identified using a number of sources (including the Joint Nature Conservation Committee (JNCC) online resource on the SPAs network (JNCC, 2025a), the Ramsar Sites Information Service (Ramsar, n.d), and NatureScot's SiteLink page (NatureScot, 2023k);
- Connectivity was established during the breeding season if a site (for which a species is a qualifying feature) is within foraging range of the Offshore Project (using species-specific foraging range (Woodward *et al.*, 2019) as recommended by NatureScot (2023b)). The foraging range metric used for each species differs, with the mean maximum +1SD the default option, however where this isn't provided within Woodward *et al.* (2019), the mean or maximum is used, and colony-specific deviations from this as recommended by NatureScot (2023b) are used. Refer to Table 6-1 in Appendix 14.1, Volume 2c for a list of the species-specific foraging ranges;
- Impacts are greatest on the sites with connectivity during the breeding season and therefore for the purpose of this report, only sites with connectivity during the breeding season are

considered. During the non-breeding season, species are not as spatially constrained as in the breeding season and can therefore exploit much larger areas (Furness, 2015);

- Where a site has multiple designations, to avoid repetition only the highest designation is listed.

14.5.1.6 Full consideration of connectivity of SPAs and Ramsar sites is provided in the Habitats Regulations Appraisal (HRA)– Screening Report (Spiorad Na Mara Ltd, 2024) and the Offshore RIAA. These cover in more detail matters associated with statutory site designations and have been informed by consultation as part of the application process (see Appendix 14.6, Volume 2c). Migratory seabirds and waterbirds, which may be associated with multiple SPAs across the UK, are not included within Table 14.17 due to their wide-ranging nature and diffuse connectivity. However, potential impacts on these species are considered within the Offshore RIAA where predicted mortality exceeds one bird per annum.

14.5.1.7 The HRA Screening Report (Spiorad Na Mara Ltd, 2024) has identified a long list of UK SPAs and Ramsar sites for which a Likely Significant Effect could not be ruled out and therefore the sites require further consideration in relation to the potential effects from the Offshore Project to cause an adverse effect on site integrity. The UK SPA and Ramsar sites not on the long list were not considered to have theoretical connectivity or to have an impact pathway in relation to the Offshore Project.

Site surveys

14.5.1.8 The site-specific DAS data will be used to inform the quantitative assessment of impacts to seabird receptors. The surveys that have been collected and used to inform the Study Area ornithological assessment are summarised in Table 14.6.

Table 14.6: Site surveys undertaken for Marine and Nearshore Ornithology

| Survey Type | Scope of Survey | Coverage of Study Area |
|--|--|--|
| DAS surveys, March 2022 - February 2024 Further details are provided in Appendix 13.1, Volume 2c. | A programme of 24 monthly DAS surveys to collect baseline data on bird assemblages associated with the Offshore Project. | Surveys covered the Array Area plus a 10 km buffer, up to MHWS (i.e. excluding areas of land within the 10 km buffer) (referred to as the 'Survey Area'; as shown in Figure 14.1, Volume 2b). |

14.5.2 DATA LIMITATIONS AND ASSUMPTIONS

14.5.2.1 Baseline characterisation of the Marine and Nearshore Ornithology Study Area and the resulting assessments of significance are based on site-specific DAS data collected over a 24-month period (March 2022-February 2024). Surveys were undertaken once per month and, as such, represent a snapshot of seabird abundance and distribution at the time each transect was flown. Seabird numbers may fluctuate both spatially and temporally in response to environmental conditions, and

bird abundance outside of the survey periods is not directly observed. A degree of this uncertainty is accounted for by ensuring that 2 full breeding and non-breeding seasons were covered within the survey window. Additionally, DAS typically provides spatial coverage of approximately 10-15% of the Study Area, with population modelling used to estimate seabird abundance and density in the spatial gaps between transects. These modelling outputs incorporate variation to reflect natural fluctuations and sampling uncertainty. The survey and sampling regime adopted is consistent with baseline characterisation surveys used for other offshore wind farm (OWF) projects and has previously been agreed by the SNCBs as suitable for this purpose.

- 14.5.2.2 The population estimates for seabird colonies used to inform the assessments in Sections 14.8, 14.9 and 14.10 are taken from the Seabirds Count data (Burnell *et al.*, 2023), which is based on census surveys undertaken between 2015-2021.
- 14.5.2.3 The current H5N1 strain of the avian disease HPAI was first recorded in the UK in summer 2021 (Falchieri *et al.*, 2022). Although existing systematic reviews indicate that diseases are seldom a key factor leading to the extinction of vertebrates, diseases can cause population crashes, leading to measurable declines in populations (Young and VanderWerf, 2023).
- 14.5.2.4 Thousands of seabird mortalities attributed to HPAI were reported across the UK in 2022, with minimum losses of almost 20,000 individuals in Scotland/*Alba* alone (NatureScot, 2023i) and by the end of 2022, 17 of the 25 UK breeding seabird species had tested positive for HPAI (Animal and Plant Health Agency, 2023).
- 14.5.2.5 In response to the outbreak of HPAI, the RSPB established the HPAI Seabird Surveys Project (Tremlett *et al.*, 2024). This involved a mixture of existing planned surveys, additional volunteer-led surveys, and RSPB-led surveys of a number of SPA colonies for 14 priority seabird species and was undertaken between May and July 2023. The survey method followed standard methods outlined in the Seabird Monitoring Handbook (Walsh *et al.*, 1995), enabling comparisons in population changes with the Seabirds Count estimates, which are based on census surveys undertaken between 2015-2021 (Burnell *et al.*, 2023).
- 14.5.2.6 The HPAI surveys were not intended to fully update the Seabirds Count data (for example, there were gaps in coverage of some sites, some counts lacked key information such as survey time, and some survey counts were estimates rather than accurate counts). However, the RSPB HPAI report (Tremlett *et al.*, 2024) is a useful indicator of how certain species are faring in light of the recent HPAI outbreak.
- 14.5.2.7 The RSPB HPAI report (Tremlett *et al.*, 2024) documented significant population changes in seabirds following the outbreak of HPAI. Gannet numbers declined by 25% across 8 SPAs when compared to the pre-HPAI baseline established by Burnell *et al.* (2023). In contrast, kittiwake populations increased by 10% across 21 SPAs, while guillemot populations declined by 6% across the same number of sites. Great skua experienced the most severe losses, with a 76% decline in breeding numbers across Scotland/*Alba*, including some colonies where losses exceeded 80%. As a

result, great skua has been added to the Red List of the Birds of Conservation Concern (BoCC) 5 (Stanbury *et al.*, 2021; 2024) due to HPAI-related declines. The report concludes that while the decline in guillemot may be partly influenced by other long-term pressures, given its pre-existing downward trend, the decline in gannet is almost certainly attributable to HPAI, particularly as the species had previously shown population increases.

- 14.5.2.8 In addition to the species highlighted in Tremlett *et al.* (2024), a British Trust for Ornithology (BTO) sea watching study conducted between 2021-2023 identified changes in seabird migration patterns, with impacts noted for great skua, sandwich tern, and black-headed gull (Macgregor *et al.*, 2024).
- 14.5.2.9 Migratory waterbird populations have also been affected by HPAI, with detections recorded among several species during the winters of 2021/22 and 2022/23. The Svalbard population of barnacle goose (*Branta leucopsis*) on the Solway Estuary was particularly affected in both years, while the Greenland population experienced substantial mortality during the 2022/23 winter, with losses continuing into 2023/24 (JNCC, 2025b). A study by Ross *et al.* (2024) on the returning Solway geese in 2022/23 suggested the development of partial immunity to HPAI, likely due to previous exposure. Encouragingly, the Svalbard barnacle goose population showed strong recovery in 2023/24, potentially due to this emerging immunity or density-dependent improvements in breeding success. However, it is too early to determine whether a similar recovery will occur in the Greenland population.
- 14.5.2.10 The baseline DAS data was collected between March 2022-February 2024 and therefore overlaps with the HPAI outbreak. However, the data presented in Appendix 14.1, Volume 2c does not demonstrate any clear evidence of impact from HPAI when comparing between years.
- 14.5.2.11 Overall, the impact of the short, medium, and long-term effects of the 2022 HPAI outbreak on seabird colony abundance and vital rates (productivity and survival) on UK breeding colonies is unclear. It is also unclear currently how the distribution and abundance of seabirds at sea has been affected as a result of the 2022 HPAI outbreak. The disease has affected over 60 bird species in the UK, including species such as gannet, razorbill, guillemot, puffin, Manx shearwater, fulmar, and small and large gull species (Pearce-Higgins *et al.*, 2023). HPAI has affected gannet and great skua colonies profoundly, with both species now facing increased risk of global extinction (Pearce-Higgins *et al.*, 2023). The UK supports 55.6% of the global gannet population and 60% of the global great skua population (JNCC, 2021).
- 14.5.2.12 In the absence of updated SNCB guidance, the assessment approach regarding HPAI aligns as closely as possible with Natural England's guidance (Natural England, 2022). During representation in response to the Scoping Report (Spiorad na Mara Limited, 2023), NatureScot stated that they welcomed the inclusion of HPAI considerations in the population viability analysis (PVA) where possible. However, NatureScot also acknowledged the challenges in incorporating HPAI and advised that a qualitative assessment would be sufficient in the absence of robust data. As specific

data on the impact of HPAI on demographic rates is currently unavailable, no direct adjustments could be made to account for such impacts in the PVA.

14.5.2.13 Nevertheless, environmental stochasticity has been incorporated into the model to reflect year-to-year variability in survival and productivity due to external factors such as weather, food availability, and disease outbreaks. Demographic stochasticity, which refers to random variation in individual survival and reproduction, has also been considered. This is particularly important for small or declining populations. These stochastic processes help simulate realistic population trajectories and provide a precautionary basis for assessing population-level impacts.

14.5.2.14 Therefore, all quantitative assessments have been carried out without explicit adjustments for HPAI, reflecting the assumption that reductions in population or colony sizes would lead to proportional reductions in at-sea densities and, consequently, predicted mortalities from the Offshore Project.

14.5.3 METHODOLOGY FOR ENVIRONMENTAL IMPACT ASSESSMENT

Introduction

14.5.3.1 The project-wide generic approach to assessment is set out in Chapter 5, Volume 1a. Specific to the Marine and Nearshore Ornithology assessment of effects, the following guidance documents have also been considered:

- Developing Guidance on Ornithological Cumulative Impact Assessment for Offshore Wind Farm Developers (King *et al.*, 2009);
- Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM, 2022);
- Joint SNCB Interim Displacement Advice Note: Advice on how to present assessment information on the extent and potential consequences of seabird displacement from Offshore Wind Farm developments (JNCC, 2022a);
- Joint SNCB Interim Displacement Advice Note: use of a 10 km buffer for red-throated diver (JNCC, 2022b);
- NatureScot Marine Ornithology Guidance Notes to support Offshore Wind Applications (NatureScot, 2020, 2023a-h, 2025a-b):
 - Guidance Note 1: Guidance to support Offshore Wind Applications: Marine Ornithology – Overview (NatureScot, 2025a);
 - Guidance Note 2: Guidance to support Offshore Wind Applications: Advice for Marine Ornithology Baseline Characterisation Surveys and Reporting (NatureScot, 2023a);
 - Guidance Note 3: Guidance to support Offshore Wind applications: Marine Birds – Identifying theoretical connectivity with breeding site Special Protection Areas using breeding season foraging ranges (NatureScot, 2023b);
 - Guidance Note 4: Guidance to Support Offshore Wind Applications: Ornithology – Determining Connectivity of Marine Birds with Marine Special Protection Areas and Breeding Seabirds from Colony SPAs in the Non-Breeding Season (NatureScot, 2023c);

- Guidance Note 5: Guidance to support Offshore Wind Applications: Recommendations for marine bird population estimates (NatureScot, 2023d);
- Guidance Note 6: Guidance to support Offshore Wind Applications – Marine Ornithology Impact Pathways for Offshore Wind Developments (NatureScot, 2023e);
- Guidance Note 7: Guidance to support Offshore Wind Applications: Marine Ornithology – Advice for assessing collision risk of marine birds (NatureScot, 2025b);
- Guidance Note 8: Guidance to support Offshore Wind applications: Marine Ornithology Advice for assessing the distributional responses, displacement and barrier effects of Marine birds (NatureScot, 2023f);
- Guidance Note 9: Guidance to support Offshore Wind applications: Marine Ornithology Advice for Seasonal Definitions for Birds in the Scottish Marine Environment (NatureScot, 2020);
- Guidance Note 10: Guidance to support Offshore Wind applications: Marine Ornithology Advice for apportioning impacts to breeding colonies (NatureScot, 2023g);
- Guidance Note 11: Guidance to support Offshore Wind Applications: Marine Ornithology – Recommendations for Seabird PVA (NatureScot, 2023h);
- UK Planning Inspectorate Advice Note Twelve: Transboundary Impacts (PINS, 2015) and Advice Note Seventeen: Cumulative Effects Assessment (PINS, 2019).

14.5.3.2 In addition, the Marine and Nearshore Ornithology assessment of effects has considered the legislative framework as defined by:

- The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 and the 2017 Habitats Regulations;
- European Commission ('EC') Directive 2009/147/EC (codified version of 79/409/EC) on the Conservation of Wild Birds (the 'Birds Directive');
- Ramsar Convention on Wetlands of International Importance 1971;
- The Nature Conservation (Scotland) Act 2004 (as amended);
- Wildlife and Countryside Act 1981 (as amended).

14.5.4 IMPACT ASSESSMENT CRITERIA

14.5.4.1 When determining the significance of effects, a 2-stage process is used which involves defining the magnitude of the potential impacts and the sensitivity of the VORs and migratory birds (collectively known as 'Marine and Nearshore Ornithology receptors', or 'receptors'. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Chapter 5, Volume 1a.

Magnitude

- 14.5.4.2 The criteria for defining magnitude in this chapter are outlined in Table 14.7. Each assessment considers the spatial extent, duration, frequency, and reversibility of impact when determining magnitude, and these are outlined within the magnitude section of each impact assessment (e.g. a duration of hours or days would be considered for most receptors to be of short-term duration, which is likely to result in a low magnitude of impact). The definitions have been adapted to be suitable for Marine and Nearshore Ornithology, following the approach and guidance set out by CIEEM (2022).
- 14.5.4.3 Where impacts can be quantified, such as through CRM or displacement analysis, the magnitude of effect is assessed in terms of the change in baseline mortality for the relevant population of the species. To support this, a threshold of a 0.02 percentage point change in survival rate has been applied to identify impacts of medium or greater magnitude. This threshold, as advised by NatureScot (letter sent to the Applicant on 8 May 2025), is used to determine whether further analysis such as population modelling is required to inform the significance of the effect.

Table 14.7: Definition of terms relating to the magnitude of an impact on Marine and Nearshore Ornithology receptors

| Magnitude of Impact | Definition |
|---------------------|---|
| High | A change in the size or extent of distribution of the relevant biogeographic population, or of the population that constitutes the interest feature of a specific protected site, may be considered significant where it is predicted to irreversibly alter that population in the short to long-term, thereby affecting its long-term viability and/or the integrity of the protected site. These impacts are considered long-term, with potential for recovery only over extended periods (i.e. more than 5 years) following cessation of the project activity. |
| Medium | A change in the size or extent of distribution of the relevant biogeographic population, or of the population that is the interest feature of a specific protected site, may occur in both the short and long-term. However, where this change is not predicted to alter the long-term viability of the population or the integrity of the protected site, the impact is considered to be of a lower magnitude. These impacts are typically felt over the medium to long-term but are expected to be reversible within a medium-term timeframe, generally within 5 years following cessation of the project activity. |
| Low | A change in the size or extent of distribution of the relevant biogeographic population, or of the population that is the interest feature of a specific protected site, may be sufficiently small in scale or short in duration that it causes no long-term harm to the population or feature. These impacts are typically present over a short to medium timeframe and are expected to be reversed in the short-term, generally within 1 year following the cessation of the project activity. |

| Magnitude of Impact | Definition |
|---------------------|---|
| Negligible | There is very slight or no change to the size or extent of distribution of the relevant biogeographic population, or of the population that is the interest feature of a specific protected site. Impacts are present only for a short duration and are expected to be rapidly reversible, typically within approximately 6 months following the cessation of project-related activity. |

Sensitivity (and value)

14.5.4.4 In order to assess the sensitivity of a receptor it is necessary to assess:

- The potential for recovery of the receptor;
- The vulnerability of the receptor to a specific impact;
- The conservation value of the receptor.

14.5.4.5 The definitions used to determine the recoverability of each receptor are presented in Table 14.8 with the parameters supporting these definitions presented in Table 14.9. The recent effects of HPAI have caused changes to many seabird populations. However, the overall recoverability defined for the purposes of assessment is based on the longer-term population trends and not the impacts caused by HPAI, which are as yet unknown.

14.5.4.6 Migratory seabirds have been included in Table 14.9, as they are assessed alongside the individually identified VORs (Table 14.2). Migratory waterbird species were also considered in the assessment; however, due to the large number of species involved, they are not included in this summary table. For the list of migratory birds considered within the assessment, see Appendix 14.4, Volume 2c. The inclusion of migratory seabirds and waterbirds reflects their relevance to the assessment, particularly where they occur in lower numbers but may still be subject to impact. Furthermore, the inclusion of migratory seabirds and waterbirds outside of any identified VORs was specifically requested by MD-LOT, NatureScot, and RSPB (see multiple entries from the consultees on migratory birds Appendix 14.6, Volume 2c).

14.5.4.7 To determine the overall sensitivity of a receptor, it is also necessary to consider its vulnerability to potential impacts. Vulnerability has been identified using information from Wade *et al.* (2016) and Bradbury *et al.* (2014), with the relevant values presented in Table 14.10.

Table 14.8: Definition of potential for recovery for Marine and Nearshore Ornithology receptors

| Potential for Recovery | Description |
|------------------------|---|
| High | A species with a medium to high reproductive potential and a stable or increasing UK trend in breeding abundance and productivity. A species with increasing wintering population. |

| Potential for Recovery | Description |
|------------------------|---|
| Medium | <p>A species with a low to medium reproductive potential and a weakly declining, stable or increasing UK long-term trend in breeding abundance and productivity.</p> <p>A species with a stable wintering population.</p> |
| Low | <p>A species with a low reproductive potential and a strong declining UK long-term trend in breeding abundance and productivity or uncertainty regarding the long-term trend (due to data availability).</p> <p>A species with a decreasing wintering population.</p> |

Table 14.9: Information used to determine recoverability of Marine and Nearshore Ornithology receptors

| Species | Clutch Size (No. of Eggs) | Age at First Breeding | Scottish Population Trend (Burnell <i>et al.</i> , 2023) | | | UK Population Trend (Burnell <i>et al.</i> , 2023) | | | Overall Recoverability |
|-------------------------|---------------------------|-----------------------|--|------------------------|------------------------|--|------------------------|------------------------|------------------------|
| | | | 1969-1970 to 1985-1988 | 1985-1988 to 1998-2002 | 1998-2002 to 2015-2021 | 1969-1970 to 1985-1988 | 1985-1988 to 1998-2002 | 1998-2002 to 2015-2021 | |
| Kittiwake | 2 | 4 | 4 | -21 | -57 | +24 | -26 | -43 | Low |
| Little gull | 2-3 | 2-3 | N/A | n/a | n/a | N/A | N/A | N/A | Medium |
| Great black-backed gull | 2-3 | 4 | -4 | -4 | -63 | -7 | -3 | -52 | Low |
| Herring gull | 3 | 4 | -42 | -28 | -44 | -48 | -26 | -44 | Low |
| Sandwich tern | 1-2 | 3 | -7 | -53 | -5 | +41 | -15 | +4 | Medium |
| Little tern | 2-3 | 3 | +21 | -14 | -29 | +58 | -26 | -25 | Low |
| Common tern | 2-3 | 3 | +58 | -21 | -24 | +9 | +2 | -9 | Medium |
| Arctic tern | 1-2 | 4 | +53 | -40 | -54 | +50 | -37 | -35 | Low |
| Great skua | 2 | 7 | +148 | +26 | +14 | +148 | +26 | +14 | Medium ² |
| Arctic skua | 2 | 4 | +226 | -37 | -66 | +226 | -37 | -66 | Low |
| Guillemot | 1 | 5 | +82 | +24 | -31 | +80 | +32 | -11 | Medium |
| Razorbill | 1 | 4 | +11 | +15 | -2 | +18 | +23 | +18 | High |
| Puffin | 1 | 5 | +7 | +6 | -21 | +15 | +13 | -14 | Medium |
| Red-throated diver | 1-3 | 3 | N/A | N/A | N/A | N/A | N/A | N/A | High ³ |

² Whilst this species has increasing population trends for the time periods for which data are available, the recent outbreak of HPAI in the UK has significantly reduced the population of this species and therefore its recoverability is downgraded from High to Medium.

³ Although population trends are not available from the sources cited in this table, Dillon *et al.* (2009) reported a 34% population increase between 1994 - 2006. More recent data from Liverpool Bay indicate continued growth, with a 27.6% increase observed between 2015 - 2020 (HiDef 2023). However, national trends from the BTO (Calbrade *et al.* 2025) show a long-term stable population across the UK, albeit from non-species-specific surveys. Given this stable or increasing population, the species is considered to have high recoverability.

| Species | Clutch Size (No. of Eggs) | Age at First Breeding | Scottish Population Trend (Burnell <i>et al.</i> , 2023) | | | UK Population Trend (Burnell <i>et al.</i> , 2023) | | | Overall Recoverability |
|----------------------|---------------------------|-----------------------|--|------------------------|------------------------|--|------------------------|------------------------|------------------------|
| | | | 1969-1970 to 1985-1988 | 1985-1988 to 1998-2002 | 1998-2002 to 2015-2021 | 1969-1970 to 1985-1988 | 1985-1988 to 1998-2002 | 1998-2002 to 2015-2021 | |
| Great northern diver | 1-3 | 6 | N/A | N/A | N/A | N/A | N/A | N/A | Medium ⁴ |
| Storm petrel | 1 | 4 | N/A | N/A | +48 | N/A | N/A | +41 | High |
| Leach's petrel | 1 | 5 | N/A | N/A | -79 | N/A | N/A | -79 | Low |
| Pomarine Skua | 1-3 | 2-4 | N/A | N/A | N/A | N/A | N/A | N/A | Medium ⁵ |
| Long-tailed Skua | 1-3 | 3 | N/A | N/A | N/A | N/A | N/A | N/A | Medium ⁶ |
| Fulmar | 1 | 9 | +77 | -3 | -37 | +77 | -3 | -37 | Low |
| Manx shearwater | 1 | 5 | N/A | N/A | N/A | N/A | N/A | N/A | High ⁷ |
| Gannet | 1 | 5 | +32 | +47 ⁸ | -25 ⁹ | +39 | +40 ⁸ | +39 ⁹ | Medium ¹⁰ |

⁴ Although population trends are not available from the sources cited in this table, data from the BTO (Calbrade *et al.* 2025) indicate a long-term increase across the UK, albeit from non-species-specific surveys. However, due to the absence of long-term, region-wide data for this species, a precautionary recoverability rating of medium has been assigned.

⁵ Although population trends are not routinely monitored for this species within Scotland/Alba or the UK during to its scarce status on migration. BirdLife International (2022) state it's population trend is 'unknown'. Due to the lack of routine monitoring and its specialised Arctic breeding ecology, the species is considered to have medium recoverability due to having up to 3 young per breeding attempt and breeding at 3 years.

⁶ Although systematic population trends are not available for this species within Scotland/Alba or the UK, there is indication of a fluctuating/increasing population at the breeding (BirdLife International, 2022; Wetlands International, 2025). Long-tailed skua is a scarce passage migrant in UK waters, with sightings typically limited to offshore migration periods. Due to stable or increasing population the species is considered to have medium recoverability for precaution.

⁷ Whilst no population trends are available from the sources included in this table, it is thought that populations of this species in the UK have increased (Burnell *et al.*, 2023).

⁸ Change between censuses in 1984 - 85 and 2003 - 04.

⁹ Change between censuses in 2003 - 04 and 2013 - 2015.

¹⁰ Despite this species showing increased population trends, it has faced significant impacts from HPAI and hence has been given a medium recoverability status

Table 14.10: Information used to determine vulnerability of Marine and Nearshore Ornithology receptors

| Species | Collision | Displacement Associated with Structures ¹¹ | Displacement Associated with Vessels and Helicopters ¹² | Habitat Flexibility | Barrier Effects ¹³ |
|-------------------------|-----------|---|--|---------------------|-------------------------------|
| Kittiwake | High | Low | Low | Medium | Low |
| Little gull | Medium | Very Low | Very Low | Medium | Low |
| Great black-backed gull | Very High | Low | Very Low | Medium | Low |
| Herring gull | Very High | Low | Very Low | High | Low |
| Sandwich tern | Very High | Low | Low | Medium | Very Low |
| Little tern | Medium | Low | Low | Low | Very Low |
| Roseate tern | High | Low | Low | Medium | Very Low |
| Common tern | Medium | Low | Low | Medium | Very Low |
| Arctic tern | Medium | Low | Low | Medium | Very Low |
| Great skua | High | Very Low | Very Low | High | Low |
| Arctic skua | High | Very Low | Very Low | High | Low |
| Guillemot | Very Low | High | Medium | Medium | High |
| Razorbill | Very Low | High | Medium | Medium | High |
| Puffin | Very Low | Medium | Medium | Medium | High |
| Red-throated diver | Medium | Very High | Very High | Low | High |
| Great northern diver | Medium | Very High | High | Medium | High |
| Storm petrel | Low | Very Low | Very Low | High | Low ¹⁴ |

¹¹ Based on Wade *et al* (2016)

¹² Based on Furness *et al.* (2013) and Wade *et al* (2016)

¹³ Based on Maclean *et al.* (2009) unless stated otherwise.

¹⁴ Based on Deakin *et al.* (2022), petrels are generally considered to have low vulnerability to displacement and disturbance from offshore wind farms. The same source notes that there is some evidence suggesting that Manx shearwater and fulmar may be sensitive to disturbance and displacement (and therefore potentially to barrier effects). However, this sensitivity is not

| Species | Collision | Displacement Associated with Structures ¹¹ | Displacement Associated with Vessels and Helicopters ¹² | Habitat Flexibility | Barrier Effects ¹³ |
|------------------|-----------|---|--|---------------------|-------------------------------|
| Leach's petrel | Low | Very Low | Very Low | High | Low ¹⁴ |
| Pomarine Skua | Low | Very Low | Very Low | High | Low ¹⁵ |
| Long-tailed Skua | Low | Very Low | Very Low | High | Not available |
| Fulmar | Very Low | Very Low | Very Low | High | Low |
| Manx shearwater | Very Low | Very Low | Very Low | High | Low ¹⁴ |
| Gannet | High | High | Very Low | High | Very Low |

well quantified, resulting in a high degree of uncertainty and preventing any definitive conclusions. Given the current lack of robust evidence regarding their sensitivity, vulnerability is currently assumed to be low.

¹⁵ A combination of displacement sensitivity scores and the findings of Dierschke et al. (2016) were used to inform the assessment of barrier effect sensitivity, as this species was not mentioned within Maclean *et al.* (2009).

- 14.5.4.8 In addition to understanding a receptor’s recoverability and vulnerability to impacts, its conservation value is also considered when determining the overall sensitivity of the receptor. Definitions of terms relating to the conservation value of receptors are shown in Table 14.11.
- 14.5.4.9 Conservation status has been defined by considering whether a species is a qualifying feature of a designated site with connectivity to the Offshore Project, and whether it is listed under relevant conservation frameworks, such as Annex I of the EU Birds Directive or the BoCC (Stanbury *et al.*, 2021; 2024).
- 14.5.4.10 Population importance has been determined by comparing site-specific survey data with relevant reference populations at local, regional, national, or international scales, in the seasons applicable to each species.
- 14.5.4.11 The conservation value of receptors is based on the population from which individuals are predicted to originate. This reflects current knowledge of species movements and acknowledges that site-based protection (e.g. SPAs) typically applies only during specific periods, such as the breeding season. As a result, conservation value can vary seasonally, depending on the number of individuals at risk and the size of the source population. Therefore, conservation value corresponds to the degree of predicted connectivity between the Offshore Project and protected populations.

Table 14.11: Definition of terms relating to the value of Marine and Nearshore Ornithology receptors

| Value | Definition ¹⁶ |
|------------|---|
| Negligible | <p><u>Conservation status</u> All species of lowest conservation status (e.g. Green-listed species listed on the BoCC 5 (Stanbury <i>et al.</i>, 2021; 2024)).</p> <p><u>Importance</u> Not recorded during baseline and regional surveys of the Study Area.</p> |
| Local | <p><u>Conservation status</u> Any other species of conservation status (e.g. Amber-listed species listed on the BoCC 5 (Stanbury <i>et al.</i>, 2021; 2024)) not covered in the categories below.</p> <p><u>Importance</u> A species which is present in the Study Area in numbers lower than 1% of the regional population.</p> |
| Regional | <p><u>Conservation status</u> Species listed on the BoCC 5 (Stanbury <i>et al.</i>, 2021; 2024) Red list; and/or Species that are the subject of a specific action plan within the UK or a species considered to be of principal importance for biodiversity and conservation in Scotland as listed on the Scottish Biodiversity List (Nature Conservation (Scotland) Act 2004).</p> <p><u>Importance</u></p> |

¹⁶ A conservation value will be determined based on the higher value associated with the conservation status or the importance of the species.

| Value | Definition ¹⁶ |
|---------------|---|
| | A species which is present at the Study Area in numbers of greater than 1% of the regional population. |
| National | <p><u>Conservation status</u> Species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) not already covered by International criteria; Species listed on Annex 1 of the EU Birds Directive; Bird species that form part of an SSSI that may potentially interact with the Study Area at some stage of their life cycle; At least 50% of the UK breeding or non-breeding population found in 10 or fewer sites; An impact on an ecologically sensitive species (<300 breeding pairs or <900 wintering individuals in the UK).</p> <p><u>Importance</u> A species which is present at the Study Area in numbers of greater than 1% of the national population.</p> |
| International | <p><u>Conservation status</u> Bird species that form part of a cited interest of an SPA or Ramsar site that may potentially interact with the Study Area at some stage of their life cycle including those listed as assemblage features; At least 20% of the European breeding or non-breeding population is found in the UK.</p> <p><u>Importance</u> A species which is present at the Study Area in numbers of greater than 1% of the international biogeographic population.</p> |

14.5.4.12 The criteria for defining sensitivity in this chapter are outlined in Table 14.12. The definitions have been adapted to be suitable for the Marine and Nearshore Ornithology receptors, following the approach and guidance set out by CIEEM (2022).

14.5.4.13 It should be noted that high vulnerability and/or low recoverability are not necessarily linked with high conservation value within a particular impact. A receptor could be categorised as being of high conservation value (e.g. an interest feature of a SPA) but have a low or negligible physical/ecological vulnerability to an effect and vice versa. Determination of sensitivity takes these differing aspects into consideration. Alongside scientific literature, expert judgement has also been used throughout the assessment to identify the sensitivity of all receptors.

Table 14.12: Definition of terms relating to the sensitivity of Marine and Nearshore Ornithology receptors

| Sensitivity of the receptor | Description |
|-----------------------------|---|
| Very High | Receptor has National or International conservation value, very high vulnerability to impact, and low to medium recoverability. |

| Sensitivity of the receptor | Description |
|-----------------------------|--|
| High | Receptor has National or International conservation value, high vulnerability to impact, and low to medium recoverability. |
| | Receptor has National or International conservation value, medium to high vulnerability to impact and has medium recoverability. |
| | Receptor has National or International conservation value, low vulnerability to impact and has low recoverability. |
| | Receptor has Regional conservation value, high vulnerability to impact and has low recoverability. |
| Medium | Receptor has National or International conservation value, high vulnerability to impact and has high recoverability. |
| | Receptor has National or International conservation value, low to medium vulnerability to impact and has medium recoverability. |
| | Receptor has Regional conservation value, high vulnerability to impact and has medium recoverability. |
| | Receptor has Regional conservation value, medium vulnerability to impact and has medium recoverability. |
| | Receptor has Regional conservation value, low vulnerability to impact and has medium recoverability. |
| | Receptor has Local conservation value, high vulnerability to impact and has low recoverability |
| Low | Receptor has Regional conservation value, medium vulnerability to impact and high recoverability. |
| | Receptor has Regional conservation value, low vulnerability to impact and high recoverability. |
| | Receptor has Local or Negligible conservation value, medium to high vulnerability to impact and low to medium recoverability. |
| Negligible | Receptor has Local or Negligible conservation value, low vulnerability to impact and medium to high recoverability. |
| | Receptor is not vulnerable to impacts. |

Significance

14.5.4.14 As described in Chapter 5, Volume 1a, the significance of the effect upon Marine and Nearshore Ornithology receptors is determined by combining the magnitude of impact with the sensitivity of the receptor. The matrix table used within the assessment of Marine and Nearshore Ornithology differs slightly from the one presented in Chapter 5, Volume 1a by incorporating an additional

sensitivity category, 'very high', and placing greater reliance on expert judgement when determining significance. This approach provides flexibility to apply the most appropriate significance classification, reflecting the variability and complexity of these highly sensitive ornithological receptors. The particular method employed for this assessment is presented in Table 14.13.

14.5.4.15 Where a range is suggested for the significance of effect, for example, minor to moderate, it is possible that this may span the significance threshold. The technical specialist's professional judgement will be applied to determine which outcome defines the most likely effect, whilst taking into account the sensitivity of the receptor and the magnitude of impact. Where professional judgement is applied to quantify final significance from a range, the assessment will set out the factors that result in the final assessment of significance. These factors may include the likelihood that an effect will occur, data certainty, and relevant information about the wider environmental context.

14.5.4.16 For the purposes of this Marine and Nearshore Ornithology EIA:

- A level of residual effect of minor or less will be considered 'not significant' in terms of the EIA Regulations;
- A level of residual effect of moderate will be considered "potentially significant" in terms of EIA Regulations;
- A level of residual effect of major will be considered a 'significant' effect in terms of the EIA Regulations.

Table 14.13: Matrix used for the assessment of the significance of the effect

| Sensitivity of receptor | Magnitude of impact | | | | |
|-------------------------|---------------------|---------------------|---------------------|---------------------|-------------------|
| | | Negligible | Low | Medium | High |
| Negligible | | Negligible | Negligible to Minor | Negligible to Minor | Minor |
| Low | | Negligible to Minor | Negligible to Minor | Minor | Minor to Moderate |
| Medium | | Negligible to Minor | Minor | Moderate | Moderate to Major |
| High | | Minor | Minor to Moderate | Moderate to Major | Major |
| Very High | | Minor | Moderate to Major | Major | Major |

Designated sites

14.5.4.17 This chapter assesses the likely significant effect in EIA terms on the qualifying interest feature(s) of Natura 2000 sites (i.e. nature conservation sites in Europe designated under the Habitats or Birds Directives) and sites in the UK that comprise the National Site Network (collectively termed 'European sites'). The Offshore RIAA includes the assessment of the potential impacts on the features of each protected site individually in terms of the Habitats Regulations.

14.5.4.18 Where locally designated sites and national designations (other than European sites) fall within the boundaries of a European site (e.g. SSSIs which have not been assessed within the Offshore RIAA)

and where qualifying interest features are the same, only the European site has been taken forward for assessment. Potential impacts on the integrity and conservation status of the Marine and Nearshore Ornithology features of a locally or nationally designated site are assumed to be inherent within the assessment of the European site, so a separate assessment for the local or national site has not been undertaken.

- 14.5.4.19 Assessment of the likely significant effect on a local or nationally designated site which falls outside the boundaries of a European site, but within the Study Area, has been considered within this chapter. Given ornithological features are highly mobile, birds within the Offshore Project's ZOI (as defined in Section 14.4.2) may be associated with designated sites over a wide area, or they may not be associated with a designated site. An individual bird may be associated with different designated sites at different times of year or across different years. Therefore, unless there is evidence to the contrary, it is assumed that the impact on a designated site is proportional to the impact of the Offshore Project on the wider regional population containing that designated site. Such evidence may include tracking data or similar indicating disproportionately high levels of connectivity between a site and the Offshore Project.
- 14.5.4.20 While impacts have been apportioned to non-European sites, these have not been assessed in any great detail as it is not the standard approach to do so. It is assumed the overall EIA-level effect conclusion is also applicable to any such designated site. Where the assessment concludes a likely significant effect on a European site, a further assessment would be undertaken to consider whether similar effects also apply to local or national sites.

14.6 BASELINE CONDITIONS

14.6.1 CURRENT BASELINE

- 14.6.1.1 The following sections provide a summary of the Marine and Nearshore Ornithology baseline environment. Full details of the analysis undertaken to develop this baseline can be found in Appendix 14.1, Volume 2c.

Important Ecological Features

- 14.6.1.2 With regards to Marine and Nearshore Ornithology, Important Ecological Features (IEFs) are termed VORs. The VORs and migratory birds identified for this assessment have been previously listed in Section 14.4.4 for VORs and migratory seabirds and within Section 2.1.3 of Appendix 14.4, Volume 2c due to the number migratory waterbirds considered. Additional details concerning the VORs and migratory seabirds are provided in this section, including details of their seasonality, populations, and baseline mortality. However, due to the large number of migratory waterbird species considered within the assessment, they are not included in the tables below which detail baseline mortality/survival rates, reference populations and demographic rates. For details on

migratory waterbirds considered within the assessment, see Annex 14.4.1 of Appendix 14.4, Volume 2c which provides full details on the migratory waterbirds parameters.

14.6.1.3 Marine and Nearshore Ornithology receptors have been identified based on the conservation status of the ornithological receptor, their known abundance from site-specific surveys and a desk-based study, and their vulnerability to impacts (for each impact that has been scoped in for the assessment). Further details can be found in Appendix 14.1, Volume 2c.

Seasonality

14.6.1.4 The behaviour and abundance of bird populations varies across an annual cycle, according to the biological seasons relevant to different seabird species. The Marine and Nearshore Ornithology receptors included in this assessment showed seasonality in their abundance and distribution during site-specific surveys, reflecting the timings of breeding and non-breeding seasons and migratory periods (pre- and post-breeding). These distinct biological seasons are acknowledged in order to assess the significance of each bird species during each specific time period.

14.6.1.5 Seasons used within this assessment were defined according to the breeding, non-breeding, and migratory periods from NatureScot (2020) and Furness (2015). Where overlaps between seasonal extents exist, the breeding season took precedence. For species only assessed as migratory seabirds, the migratory periods from WWT Consulting and MacArthur Green (2014) are provided. Seasons relevant to each VOR and migratory seabirds are presented in Table 14.14.

14.6.1.6 Further information on the derivation of seasons is presented in Appendix 14.1, Volume 2c.

Reference populations

14.6.1.7 Regional, national, and international population estimates for all identified VORs and migratory seabirds are defined in Table 14.15. The estimates have been derived using a number of sources, which are summarised in the following paragraphs and referenced in footnotes below Table 14.15. Where possible, population estimates have been calculated using data that is contemporaneous with the site-specific surveys. For species solely assessed as migratory seabirds, only the relevant migratory population is provided, derived from WWT Consulting and MacArthur Green (2014).

14.6.1.8 International populations were derived from figures provided in African-Eurasian Waterbird Agreement (AEWA) Conservation Status Report (CSR) 8 (Wetlands International, 2025).

14.6.1.9 National populations (all age classes) were derived from Woodward *et al.* (2020), Furness (2015) Burton *et al.* (2012), or Stienen *et al.* (2007), with national breeding populations from Seabirds Count (Burnell *et al.*, 2023). National populations refer to the UK total, and for some species may be lower than the regional population which can include colonies outside of the UK, such as on the Isle of Man and in the Republic of Ireland.

14.6.1.10 For most species, count data are provided in the form of breeding pairs (e.g. as Apparently Occupied Nests), whilst for guillemot and razorbill, counts are of individuals at the colony. For

species counted as breeding pairs, the number of individual adults is calculated as 2x the number of breeding pairs, whilst for guillemot and razorbill it is assumed that each individual counted at the colony represents 0.67 breeding pairs (Walsh *et al.*, 1995), and therefore 1.34 individual adults. This correction factor is a standard approach and used within the UK wide census (Burnell *et al.*, 2023) The number of immatures in each population is calculated by applying the ratio of immatures to adults provided in the relevant species accounts in Furness (2015) to the number of individual adults. The breeding adult and immature populations are then summed to provide the regional population for the breeding season. This approach makes the assumption that all immatures associated with each breeding colony will be present within the foraging range defined for each species. This approach is therefore likely to underestimate the population size (overestimate the proportional impact) as it does not take account of immature/juvenile birds that are moving between breeding colonies and which are yet to reach breeding age. These birds would therefore be part of multiple populations.

- 14.6.1.11 Regional populations for the breeding season were estimated by summing the most recent population counts, extracted from Seabirds Count data (Burnell *et al.*, 2023) for all breeding colonies within the foraging range distance from the Offshore Project Boundary for each species (refer to Table 6-1 in Appendix 14.1, Volume 2c for a list of the species-specific foraging ranges used) . For consistency, the regional breeding population for species considered in the Offshore RIAA (kittiwake, guillemot, razorbill, puffin, and gannet) has been expanded to include all colonies within SPAs for which the SPA boundary is within foraging range of the boundary of the Turbine Area, and also any non-SPA colonies that are at least as close as any SPA colonies brought in under that rule. This follows NatureScot's project-specific advice on RIAA Apportionment (NatureScot; email sent to the Applicant, 8 May 2025).
- 14.6.1.12 For the regional breeding population of red-throated diver, the baseline characterisation did not identify any available data. However, there is a requirement to include the species in assessment due to predicted displacement impacts. As such, the latest available count of breeding red-throated diver of 80 breeding pairs was used, derived from the Lewis Peatlands SPA citation and taken from national survey carried out in 2006 and reported in Dillon *et al.* (2009).
- 14.6.1.13 Outside of the breeding season, regional populations for other seasons are defined using the BDMPS for each species, obtained from Furness (2015) or other relevant sources. For non-breeding species present in winter or on passage, the relevant regional population was considered to be the Western waters with relevant BDMPS populations from Furness (2015). The exception to the above is guillemot, for which, in line with NatureScot guidance (NatureScot, 2023c), the non-breeding population is assumed to be equal to the regional population in the breeding season, comprising breeding adults from colonies within recommended foraging range and immature birds associated with that breeding population.

Baseline mortality rates

- 14.6.1.14 The impact of additional mortality due to Offshore Project's effects is assessed in terms of the potential resultant change in the baseline mortality rate. It has been assumed that all age classes are equally at risk of effects, with each age class affected in proportion to its presence in the population. As such, a weighted average baseline mortality rate has been calculated for the species identified as VORs and migratory seabirds. This is therefore appropriate for use in assessments for all age classes.
- 14.6.1.15 Age-specific survival rates for each species from Horswill and Robinson (2015) were entered into a matrix population model. Updated productivity values were provided by JNCC/BTO (JNCC *et al.*, 2024), with the UK average over the course of 2010-2019 calculated and used. Not all species and colonies had updated counts after 2014, and so the national average from Horswill and Robinson (2015) was used if no updated rates from JNCC/BTO were made available. Productivity values were used to calculate the expected proportions in each age class. Each age class survival rate was multiplied by its proportion, and the total for all ages summed to give the average survival rate for all ages. The average mortality rate was subsequently calculated by subtracting the survival rate from 1. The demographic rates, age class proportions, and average mortality rates calculated are presented in Table 14.16.
- 14.6.1.16 Baseline mortality rates for migratory waterbirds represent adult baseline mortality rates from relevant literature sources (Robinson, 2005). Full details are presented in Annex 14.4.1 of Appendix 14.4, Volume 2c.

Table 14.14: Seasonal definitions for the VORs and migratory seabirds considered in this report for Marine and Nearshore Ornithology

| Species | Source | Seasonal Definitions | | | |
|-------------------------|---|---|-----------------------|-------------------|-------------------|
| | | Breeding | Post-Breeding | Non-Breeding | Pre-Breeding |
| Kittiwake | NatureScot (2020); Furness (2015) | Mid April-August | September-December | N/A | January-Mid April |
| Great black-backed gull | NatureScot (2020); Furness (2015) | April-August | N/A | September-March | N/A |
| Herring gull | NatureScot (2020); Furness (2015) | April-August | N/A | September-March | N/A |
| Little gull | WWT Consulting and MacArthur Green (2014) | Autumn migration: June-September. Spring migration: March. | | | |
| Sandwich tern | NatureScot (2020); Furness (2015) | Mid April-mid September | July-September | N/A | March-mid April |
| Little tern | NatureScot (2020); Furness (2015) | Mid May-August | Early September | N/A | Mid April-May |
| Common tern | NatureScot (2020); Furness (2015) | May-mid September | N/A | N/A | April |
| Arctic tern | NatureScot (2020); Furness (2015) | May-August | September | N/A | April |
| Arctic skua | NatureScot (2020); Furness (2015) | May-August | August-October | N/A | April-May |
| Great skua | NatureScot (2020); Furness (2015) | Mid April-mid September | Mid September-October | November-February | March-mid April |
| Pomarine skua | WWT Consulting and MacArthur Green (2014) | Autumn migration: September-October. Spring migration: April-May. | | | |
| Long-tailed skua | WWT Consulting and MacArthur Green (2014) | Autumn migration: August-September. Spring migration: May. | | | |
| Guillemot | NatureScot (2020); Furness (2015) | April-mid August | N/A | Mid August-March | N/A |
| Razorbill | NatureScot (2020); Furness (2015) | April-mid August | Mid August - October | November-December | January-March |
| Puffin | NatureScot (2020); Furness (2015) | April-mid August | N/A | Mid August-March | N/A |

| Species | Source | Seasonal Definitions | | | |
|----------------------|---|---|--------------------------|------------------|-------------------|
| | | Breeding | Post-Breeding | Non-Breeding | Pre-Breeding |
| Red-throated diver | NatureScot (2020); Furness (2015) | March-mid September | Mid September - November | December-January | February-April |
| Great northern diver | NatureScot (2020); Furness (2015) | N/A | N/A | September-May | N/A |
| Storm petrel | WWT Consulting and MacArthur Green (2014) | Autumn migration: July-October. Spring migration: April-May. | | | |
| Leach's petrel | WWT Consulting and MacArthur Green (2014) | Autumn migration: September-October. Spring migration: April. | | | |
| Fulmar | NatureScot (2020); Furness (2015) | April-mid September | Mid September-October | November | December-March |
| Manx shearwater | NatureScot (2020); Furness (2015) | April-mid October | N/A | N/A | March |
| Gannet | NatureScot (2020); Furness (2015) | March-September | October-November | N/A | December-February |

Table 14.15: Regional, national, and international population sizes for the VORs and migratory seabirds included in this report for Marine and Nearshore Ornithology

| Species | Breeding | | | | Post-Breeding | | Non-Breeding | | Pre-Breeding | |
|-------------------------|---|---|---------------------------------|--|------------------------------|------------------------|------------------------------|------------------------|------------------------------|-----------|
| | Regional (Adults and Immatures) ¹⁷ | National (Breeding Pairs) ¹⁸ | National (Adults and Immatures) | International ¹⁹ (Mature Individuals) | Regional BDMPS ²⁰ | National ²⁰ | Regional BDMPS ²⁰ | National ²¹ | Regional BDMPS ²⁰ | National |
| Kittiwake | 221,825 | 215,913 | 811,833 | 6,100,000 | 911,586 | 1,741,523 | N/A | N/A | 691,526 | 1,319,342 |
| Great black-backed gull | 1,645 | 8,021 | 36,255 | 240,000-310,000 | N/A | N/A | 34,380 | 143,521 | N/A | N/A |
| Herring gull | 3,148 | 237,573 | 993,055 | 740,000-780,000 | N/A | N/A | 173,299 | 639,810 | N/A | N/A |
| Little gull | Autumn migration: 3,000 individuals. Spring migration: 400 individuals. ²² | | | | | | | | | |
| Sandwich tern | Autumn migration: 10,761 individuals. Spring migration: 10,761 individuals ⁷ | | | | | | | | | |
| Little tern | Autumn migration: 1,602 individuals. Spring migration: 1,602 individuals ⁷ | | | | | | | | | |
| Common tern | 324 | 12,219 | 40,811 | 1,270,000-2,020,000 | 64,659 | 209,570 | N/A | N/A | 64,659 | 209,570 |
| Arctic tern | 1,814 | 30,451 | 96,225 | 2,600,000-4,400,000 | 71,398 | 235,328 | N/A | N/A | 71,398 | 235,328 |
| Arctic skua | N/A | 727 | 2,486 | 54,200-83,000 | 5,287 | 11,714 | N/A | N/A | 5,111 | 6,338 |

¹⁷ Calculated based on Seabirds Count (Burnell *et al.*, 2023) colony totals within the foraging range of the Study Area.

¹⁸ Sourced from Seabirds Count (Burnell *et al.*, 2023) unless stated otherwise.

¹⁹ Sourced from AEWA CSR8 (Wetlands International, 2025) or Birdlife International (2022).

²⁰ Sourced from Furness (2015) unless otherwise stated.

²¹ Sourced from Woodward *et al.* (2020), Burton *et al.* (2012) or Furness (2015).

²² This species is assessed only as a migratory species, and only data for migratory population numbers are presented. Sourced from WWT Consulting and MacArthur Green (2014).

| Species | Breeding | | | | Post-Breeding | | Non-Breeding | | Pre-Breeding | |
|--------------------|---|---|---------------------------------|--|------------------------------|------------------------|------------------------------|------------------------|------------------------------|-----------|
| | Regional (Adults and Immatures) ¹⁷ | National (Breeding Pairs) ¹⁸ | National (Adults and Immatures) | International ¹⁹ (Mature Individuals) | Regional BDMPS ²⁰ | National ²⁰ | Regional BDMPS ²⁰ | National ²¹ | Regional BDMPS ²⁰ | National |
| Great skua | 53,100 | 10,937 | 52,935 | 39,000-45,000 | 16,336 | 35,892 | 1,398 | 1,541 | 25,090 | 33,575 |
| Pomarine skua | Autumn migration: 2,000 individuals. Spring migration: 3,000 individuals. ²² | | | | | | | | | |
| Long-tailed skua | Autumn migration: 1,000 individuals. Spring migration: 1,000 individuals. ²² | | | | | | | | | |
| Guillemot | 278,589 | 1,265,888 (Individuals at the colony) | 2,951,544 | 5,100,000-6,200,000 | N/A | N/A | 278,589 ²³ | 2,756,526 | N/A | N/A |
| Razorbill | 55,523 | 225,015 (individuals at the colony) | 527,660 | 830,000-2,000,000 | 606,914 | 1,198,788 | 341,422 | 560,044 | 606,914 | 1,198,788 |
| Puffin | 1,194,457 | 474,679 | 1,936,690 | 11,00,000-12,000,000 | N/A | N/A | 304,557 | 536,514 | N/A | N/A |
| Red-throated diver | 278 | 1,250 ²⁴ | 2,500 (adults only) | 210,000-340,000 | 4,373 | 17,650 | 861 | 15,371 | 4,373 | 17,650 |

²³ In line with NatureScot guidance (NatureScot, 2023c), the non-breeding regional population for guillemot is assumed to be equal to the regional population in the breeding season.

²⁴ Sourced from Woodward *et al.* (2020)

| Species | Breeding | | | | Post-Breeding | | Non-Breeding | | Pre-Breeding | |
|----------------------|---|---|---------------------------------|--|------------------------------|------------------------|------------------------------|------------------------|------------------------------|-----------|
| | Regional (Adults and Immatures) ¹⁷ | National (Breeding Pairs) ¹⁸ | National (Adults and Immatures) | International ¹⁹ (Mature Individuals) | Regional BDMPS ²⁰ | National ²⁰ | Regional BDMPS ²⁰ | National ²¹ | Regional BDMPS ²⁰ | National |
| Great northern diver | N/A | N/A | N/A | 8,600,11,000 | N/A | N/A | 2,000 | 4,400 | N/A | N/A |
| Storm petrel | Autumn migration: 200,000 individuals. Spring migration: 100,000 individuals. ²² | | | | | | | | | |
| Leach's petrel | Autumn migration: 500,000 individuals. Spring migration: 200,000 individuals. ²² | | | | | | | | | |
| Fulmar | 1,142,437 | 319,508 | 1,035,206 | 4,57,000-14,300,000 | 828,194 | 1,785,696 | 556,367 | 1,125,103 | 828,194 | 1,785,696 |
| Manx shearwater | 3,391,554 | 786,743 | 2,895,214 | 631,000-718,000 | 1,580,895 | 1,589,402 | N/A | N/A | 1,580,895 | 1,589,402 |
| Gannet | 922,238 | 304,176 | 1,101,117 | 1,600,000 | 545,954 | 1,002,252 | N/A | N/A | 661,888 | 910,273 |

Table 14.16: Demographic rates from Horswill and Robinson (2015) and JNCC/BTO (JNCC *et al.*, 2024) and population age ratios calculated from population models used to estimate average mortality for use in impact assessment

| Species | Parameter | Age Class (Years) | | | | | | | | Productivity | Average Mortality |
|---------------------------|--------------------------|---------------------|-------|-------|-------|-------|-----|-----|-------|--------------|-------------------|
| | | 0-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 | 6-7 | Adult | | |
| Kittiwake | Survival | 0.790 | 0.854 | 0.854 | 0.854 | N/A | N/A | N/A | 0.854 | 0.619 | 0.156 |
| | Proportion in population | 0.160 | 0.126 | 0.107 | 0.090 | N/A | N/A | N/A | 0.517 | | |
| Great black-backed gull | Survival | 0.798 ²⁵ | 0.930 | 0.930 | 0.930 | 0.930 | N/A | N/A | 0.930 | 1.061 | 0.095 |
| | Proportion in population | 0.188 | 0.134 | 0.112 | 0.094 | 0.078 | N/A | N/A | 0.394 | | |
| Herring gull | Survival | 0.798 | 0.834 | 0.834 | 0.834 | 0.834 | N/A | N/A | 0.834 | 0.498 | 0.171 |
| | Proportion in population | 0.132 | 0.110 | 0.096 | 0.084 | 0.073 | N/A | N/A | 0.505 | | |
| Little gull ²⁶ | Survival | 0.410 | 0.710 | 0.710 | N/A | N/A | N/A | N/A | 0.828 | 0.543 | 0.267 |
| | Proportion in population | 0.185 | 0.084 | 0.067 | N/A | N/A | N/A | N/A | 0.664 | | |
| Sandwich tern | Survival | 0.358 | 0.741 | 0.741 | N/A | N/A | N/A | N/A | 0.898 | 0.702 | 0.248 |
| | Proportion in population | 0.226 | 0.083 | 0.063 | N/A | N/A | N/A | N/A | 0.627 | | |
| Little tern | Survival | 0.578 ²⁷ | 0.899 | 0.899 | N/A | N/A | N/A | N/A | 0.899 | 0.518 | 0.154 |
| | Proportion in population | 0.167 | 0.095 | 0.085 | N/A | N/A | N/A | N/A | 0.654 | | |
| Common tern | Survival | 0.441 | 0.441 | 0.850 | N/A | N/A | N/A | N/A | 0.883 | 0.764 | 0.273 |
| | Proportion in population | 0.239 | 0.111 | 0.051 | N/A | N/A | N/A | N/A | 0.599 | | |
| Arctic tern | Survival | 0.441 ²⁸ | 0.837 | 0.837 | N/A | N/A | N/A | N/A | 0.837 | 0.380 | 0.215 |
| | Proportion in population | 0.135 | 0.060 | 0.050 | 0.042 | N/A | N/A | N/A | 0.715 | | |
| Arctic skua | Survival | 0.346 | 0.346 | 0.346 | 0.346 | N/A | N/A | N/A | 0.910 | 0.487 | 0.256 |
| | Proportion in population | 0.188 | 0.071 | 0.027 | 0.010 | N/A | N/A | N/A | 0.705 | | |

²⁵ In the absence of immature survival data within Horswill & Robinson (2015) for great black-backed gull, the herring gull value has been utilised

²⁶ Horswill & Robinson (2015) advise to use values from either common gull or black-headed gull for little gull. Common gull values therefore have been used.

²⁷ Data in Horswill & Robinson (2015) is lacking for little tern. Data from BTO (2025) was utilised

²⁸ In the absence of immature survival data within Horswill & Robinson (2015) value for Arctic tern taken from APEM Ltd and RWE Renewables UK (2023)

| Species | Parameter | Age Class (Years) | | | | | | | | Productivity | Average Mortality |
|----------------------|--------------------------|--------------------|-------|-------|-------|-------|-------|---------------------|---------------------|---------------------|--------------------|
| | | 0-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 | 6-7 | Adult | | |
| Great skua | Survival | 0.730 | 0.730 | 0.730 | 0.730 | 0.730 | 0.882 | 0.882 | 0.882 | 0.651 | 0.191 |
| | Proportion in population | 0.152 | 0.116 | 0.089 | 0.068 | 0.052 | 0.040 | 0.037 | 0.446 | | |
| Pomarine skua | Survival | Data not available | | | | N/A | N/A | N/A | Data not available | Data not available | Data not available |
| | Proportion in population | Data not available | | | | N/A | N/A | N/A | Data not available | | |
| Long-tailed skua | Survival | Data not available | | | N/A | N/A | N/A | N/A | 0.890 ²⁹ | Data not available | 0.110 |
| | Proportion in population | Data not available | | | N/A | N/A | N/A | N/A | N/A | | |
| Guillemot | Survival | 0.560 | 0.792 | 0.917 | 0.939 | 0.939 | 0.939 | N/A | 0.939 | 0.583 | 0.133 |
| | Proportion in population | 0.153 | 0.084 | 0.065 | 0.058 | 0.053 | 0.049 | N/A | 0.538 | | |
| Razorbill | Survival | 0.630 | 0.630 | 0.895 | 0.895 | 0.630 | N/A | N/A | 0.895 | 0.532 | 0.188 |
| | Proportion in population | 0.155 | 0.101 | 0.067 | 0.062 | 0.057 | N/A | N/A | 0.558 | | |
| Puffin | Survival | 0.709 | 0.709 | 0.709 | 0.760 | 0.805 | N/A | N/A | 0.906 | 0.555 | 0.176 |
| | Proportion in population | 0.155 | 0.113 | 0.082 | 0.060 | 0.046 | N/A | N/A | 0.544 | | |
| Red-throated diver | Survival | 0.600 | 0.620 | 0.620 | N/A | N/A | N/A | N/A | 0.840 | 0.571 | 0.250 |
| | Proportion in population | 0.188 | 0.122 | 0.082 | N/A | N/A | N/A | N/A | 0.608 | | |
| Great northern diver | Survival | 0.770 | 0.770 | 0.770 | N/A | N/A | N/A | N/A | 0.870 | 0.543 | 0.163 |
| | Proportion in population | 0.136 | 0.108 | 0.086 | N/A | N/A | N/A | N/A | 0.670 | | |
| Storm petrel | Survival | Data not available | | | | N/A | N/A | N/A | 0.870 ³⁰ | 0.370 ³¹ | 0.130 |
| | Proportion in population | Data not available | | | | N/A | N/A | N/A | Data not available | | |
| Leach's petrel | Survival | Data not available | | | | N/A | N/A | 0.880 ¹⁵ | 0.490 ³² | 0.120 | |
| | Proportion in population | Data not available | | | | N/A | N/A | Data not available | | | |

²⁹ Information unavailable in Horswill & Robinson (2015) and BTO (2025). Alternative source of Julien *et al.* (2013) utilised.

³⁰ Value taken from BTO (2025)

³¹ Value taken from Zuberogitia *et al.* (2016)

³² Value taken from Hedd & Montevecchi (2006)

| Species | Parameter | Age Class (Years) | | | | | | | | Productivity | Average Mortality |
|-----------------|--------------------------|---------------------|-------|-------|-------|-------|-----|-----|-------|--------------|-------------------|
| | | 0-1 | 1-2 | 2-3 | 3-4 | 4-5 | 5-6 | 6-7 | Adult | | |
| Fulmar | Survival | 0.260 ³³ | | | | | | | 0.936 | 0.410 | 0.221 |
| | Proportion in population | 0.233 | | | | | | | 0.767 | | |
| Manx shearwater | Survival | 0.870 | 0.870 | 0.870 | 0.870 | 0.870 | N/A | | 0.870 | 0.600 | 0.130 |
| | Proportion in population | 0.140 | 0.120 | 0.103 | 0.089 | 0.077 | N/A | | 0.471 | | |
| Gannet | Survival | 0.424 | 0.829 | 0.891 | 0.895 | 0.895 | N/A | | 0.919 | 0.766 | 0.193 |
| | Proportion in population | 0.201 | 0.084 | 0.069 | 0.061 | 0.054 | N/A | | 0.531 | | |

³³ Survival rate applies to age classes 0 to 8

Designated sites

- 14.6.1.17 The designated sites and relevant qualifying features identified for this chapter are described in Table 14.17. As described in paragraph 14.5.1.5, sites were identified according to the foraging ranges of the qualifying features (refer to Table 6-1 in Appendix 14.1, Volume 2c for a list of foraging ranges).
- 14.6.1.18 The closest distance between the edge of the Turbine Area/Offshore Project Boundary and the edge of the designated site was calculated using the computer programme 'R'. The measurement is a by-sea distance between the Turbine Area or Offshore Project Boundary and the closest part of the designated site, accounting for land mass.
- 14.6.1.19 The species listed include individual named qualifying features and those named as main components of an assemblage feature and have been limited to those identified as VORs (listed in Table 14.2). For migratory seabirds and waterbirds, any associated SPAs considered relevant to the assessment are discussed and assessed within the Offshore RIAA.

Table 14.17: Designated sites and relevant qualifying interest features identified as VORs for the Marine and Nearshore Ornithology EIA Chapter

| Designated Site | Closest Distance to Turbine Area (by sea) (km) | Closest Distance to Offshore Project Boundary (by sea) (km) | Relevant Qualifying Interest Feature(s) |
|--|--|---|---|
| Aberdaron Coast and Bardsey Island SPA | 644.9 | 639.4 | Manx shearwater |
| Ailsa Craig SPA | 400.4 | 393.5 | Gannet |
| Auskerry SPA | 250.7 | 249.3 | Storm petrel |
| Beara Peninsula SPA | 843.1 | 841.5 | Fulmar |
| Blasket Islands SPA | 757.1 | 755.5 | Fulmar Manx shearwater |
| Buchan Ness to Collieston Coast SPA | 386.5 | 385.1 | Fulmar |
| Calf of Eday SPA | 246.4 | 244.8 | Kittiwake Fulmar |
| Canna and Sanday SPA | 154.3 | 148.9 | Kittiwake Puffin |
| Cape Wrath SPA | 93.0 | 91.5 | Kittiwake Guillemot Razorbill Puffin Fulmar |
| Clare Island SPA | 564.1 | 562.5 | Fulmar |
| Cliffs of Moher SPA | 674.7 | 673.1 | Fulmar |
| Copeland Islands SPA | 431.4 | 426.0 | Manx shearwater |
| Copinsay SPA | 231.9 | 230.5 | Kittiwake Fulmar |

| Designated Site | Closest Distance to Turbine Area (by sea) (km) | Closest Distance to Offshore Project Boundary (by sea) (km) | Relevant Qualifying Interest Feature(s) |
|--|--|---|---|
| Cruagh Island SPA | 596.5 | 594.9 | Manx shearwater |
| Deenish Island and Scariff Island SPA | 808.7 | 807.1 | Fulmar Manx shearwater |
| Dingle Peninsula SPA | 739.1 | 737.5 | Fulmar |
| Duvillaun Islands SPA | 532.0 | 530.4 | Fulmar |
| East Caithness Cliffs SPA | 284.3 | 283.0 | Kittiwake Fulmar |
| Fair Isle SPA | 315.6 | 314.0 | Fulmar Gannet |
| Fetlar SPA | 412.7 | 412.5 | Fulmar |
| Flamborough and Filey Coast SPA | 742.4 | 741.0 | Fulmar (seabird assemblage) |
| Flannan Isles SPA | 32.0 | 32.0 | Kittiwake Guillemot Razorbill Puffin Fulmar |
| Forth Islands SPA | 578.4 | 569.4 | Gannet |
| Foula SPA | 321.6 | 321.6 | Fulmar |
| Fowlsheugh SPA | 433.0 | 431.6 | Fulmar |
| Glannau Aberdaron ac Ynys Enlli / Aberdaron Coast and Bardsey Island SPA | 644.9 | 639.4 | Manx shearwater |
| Grassholm SPA | 771.3 | 765.8 | Gannet |
| Handa SPA | 82.2 | 80.2 | Kittiwake Guillemot Razorbill Fulmar |
| Hermaness, Saxa Vord and Valla Field SPA | 415.1 | 414.9 | Fulmar Gannet |
| High Island, Inishshark and Davillaun SPA | 585.4 | 583.8 | Fulmar |
| Horn Head to Fanad Head SPA | 358.1 | 356.5 | Fulmar |
| Hoy SPA | 189.1 | 187.5 | Kittiwake Puffin Fulmar |
| Irish Sea Front SPA | 537.9 | 532.4 | Manx shearwater |

| Designated Site | Closest Distance to Turbine Area (by sea) (km) | Closest Distance to Offshore Project Boundary (by sea) (km) | Relevant Qualifying Interest Feature(s) |
|---|---|---|--|
| Isle of Scilly SPA | 978.2 | 972.6 | Manx shearwater |
| Iveragh Peninsula SPA | 785.2 | 783.6 | Fulmar |
| Kerry Head SPA | 720.9 | 719.3 | Fulmar |
| Lambay Island SPA | 572.1 | 566.6 | Fulmar |
| Lewis Peatlands SPA | 5.5 (straight line distance as terrestrial SPA) | 2.4 (straight line distance as terrestrial SPA) | Red-throated diver |
| Marwick Head SPA | 207.6 | 206.0 | Kittiwake |
| Mingulay and Berneray SPA | 180.9 | 179.3 | Kittiwake Puffin Fulmar |
| Mousa SPA | 370.7 | 370.7 | Storm petrel |
| North Caithness Cliffs SPA | 161.2 | 159.8 | Kittiwake Puffin Fulmar |
| North Colonsay and Western Cliffs SPA | 264.8 | 259.3 | Kittiwake |
| North Rona and Sula Sgeir SPA | 71.9 | 71.9 | Kittiwake Great black-backed gull Guillemot Razorbill Puffin Storm petrel Leach's petrel Fulmar Gannet |
| Noss SPA | 386.2 | 386.2 | Fulmar Gannet |
| Outer Firth of Forth and St Andrews Bay Complex SPA | 507.9 | 506.6 | Manx shearwater Gannet |
| Puffin Island SPA | 790.3 | 788.7 | Fulmar Manx shearwater |
| Priest Island (Summer Isles) SPA | 97.4 | 96.5 | Storm petrel |
| Ramna Stacks and Gruney SPA | 393.2 | 393.2 | Leach's petrel |
| Rathlin Island SPA | 357.0 | 351.1 | Fulmar |
| Rousay SPA | 222.6 | 221.0 | Kittiwake Fulmar |
| Rum SPA | 157.9 | 152.5 | Kittiwake Manx shearwater |

| Designated Site | Closest Distance to Turbine Area (by sea) (km) | Closest Distance to Offshore Project Boundary (by sea) (km) | Relevant Qualifying Interest Feature(s) |
|--|--|---|---|
| Saltee Islands SPA | 738.9 | 733.5 | Fulmar |
| Seas off St Kilda SPA | 48.1 | 48.1 | Guillemot Puffin Storm petrel Gannet |
| Skelligs SPA | 797.9 | 796.3 | Fulmar Manx shearwater |
| Skomer, Skokholm and the Seas off Pembrokeshire/ Sgomer, Sgogwm a Moroedd Penfro SPA | 766.6 | 761.1 | Manx shearwater |
| St Kilda SPA | 102.9 | 102.9 | Kittiwake Razorbill Puffin Fulmar Manx shearwater Gannet |
| Sule Skerry and Sule Stack SPA | 140.6 | 139.0 | Guillemot Puffin Storm petrel Leach's petrel Gannet |
| Sumburgh Head SPA | 352.9 | 351.3 | Fulmar |
| The Shiant Isles SPA | 104.8 | 89.5 | Kittiwake Razorbill Puffin Fulmar |
| Tory Island SPA | 361.3 | 359.6 | Fulmar |
| Treshnish Isles SPA | 220.1 | 214.7 | Storm petrel |
| Troup, Pennan and Lion's Heads SPA | 328.5 | 327.5 | Fulmar |
| West Donegal Coast SPA | 379.3 | 377.6 | Fulmar |
| West Westray SPA | 233.2 | 231.8 | Kittiwake Fulmar |

14.6.2 FUTURE BASELINE

14.6.2.1 The EIA Regulations (The Electricity Works (Environmental Impact Assessment) (Scotland)

Regulations 2017, The Marine Works (Environmental Impact Assessment) (Scotland) Regulations

2017) require the following to be included within the EIA: *"a description of the relevant aspects of*

the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without development as far as natural changes from the baseline scenario can be assessed with reasonable effort, on the basis of the availability of environmental information and scientific knowledge”.

- 14.6.2.2 In the event that the Offshore Project does not come forward, an assessment of the future baseline conditions has been carried out and is described within this section.
- 14.6.2.3 The UK is home to internationally important populations of seabirds (Mitchell *et al.*, 2004). UK seabird populations have shown a marked decline over the last 2 decades with over a third of species experiencing declines in breeding abundance of up to 30% or more since the early 1990s (JNCC, 2020; Mitchell *et al.*, 2020).
- 14.6.2.4 Recent analyses suggest that, in terms of the number of seabird species affected and the average impact to those species, the 3 key threats to seabird populations worldwide are invasive species (165 species across all threatened groups), bycatch in fisheries (100 species but has the greatest average impact), and climate change (96 species affected) (Dias *et al.*, 2019; Mitchell *et al.*, 2020).
- 14.6.2.5 Most species of seabird in the UK are at the southern limit of their range in the northeast Atlantic and therefore an increase in global temperatures could result in a shift in species' range with the potential for overall declines in population size (Frederiksen *et al.*, 2007, 2013; Mitchell *et al.*, 2020). In the UK and Ireland, climate change is considered to be the likely primary cause of decline in seabird populations in the future, with breeding conditions anticipated to worsen for most species either indirectly, for example via changes in prey abundance, or directly, for example during extreme weather events (Mitchell *et al.*, 2020).
- 14.6.2.6 It is likely that fisheries management will also impact future seabird populations in the UK and Ireland. For many years, seabird species have benefitted from fisheries discards; for scavenging species such as herring gull, kittiwake, great skua, and fulmar, population levels may already be above those that would be sustained by naturally occurring food sources (Votier *et al.*, 2004; Frederiksen *et al.*, 2013). The introduction between 2015-2019 of the Common Fisheries Policy Landings Obligation ('discard ban') has reduced the discard available, which is likely to have put more pressure on scavenging species.
- 14.6.2.7 On the other hand, the UK and Scottish Governments recently announced their intention to close the sandeel fisheries in all Scottish waters and the English North Sea (Department for Environment, Food & Rural Affairs (DEFRA), 2024; Scottish Government, 2024a). The intention of this action is to improve the sandeel population, and therefore also benefit predators including seabirds that feed upon sandeels, such as kittiwake, puffin, and guillemot. This closure may therefore have the effect of reducing pressure on these species.
- 14.6.2.8 In summary, in the absence of the Offshore Project, seabird populations would be expected to continue to follow their current population trends, which in many cases is a continuation of

declining populations driven predominantly by the factors discussed in this section. Climate change is considered to be the likely primary cause of decline in seabird populations in the future. It is believed that the absence of the Offshore Project would further delay the transition of the UK from reliance on fossil fuels and therefore further contribute towards climate change impacts and declining seabird populations.

14.7 BASIS FOR ENVIRONMENT IMPACT ASSESSMENT

14.7.1 MAXIMUM DESIGN SCENARIO

14.7.1.1 Assessing using a Project Design Envelope (PDE) approach means that the assessment considers a Maximum Design Scenario (MDS), while maintaining flexibility for future refinements that cannot be predicted at the time of consent application submission. The MDS represents the maximum extent of a parameter for each impact-receptor, ensuring that the assessment captures the worst-case scenario. As a result, any final design that falls within the PDE and is equal to or smaller than the parameters assessed will result in environmental effects that are less than or equal to those presented in this chapter. This approach ensures that impacts of greater adverse significance would not arise should any other development scenario (as described in Chapter 3, Volume 1a) be taken forward in the final scheme design.

14.7.1.2 The Offshore Project considers a PDE derived from the smallest and largest turbine types, as described in Section 3.5.8 of Chapter 3, Volume 1a. To maintain flexibility and accommodate technological advancements, the PDE presents 2 bounding scenarios that define key maximum design parameters for assessment; up to 60 of the smaller wind turbine type and up to 44 of the larger wind turbine type. For the purposes of this chapter, the MDS assumes that the configuration resulting in the greatest potential impact on Marine and Nearshore Ornithology receptors is assessed, which in this case is the scenario with the larger number of smaller wind turbines. The consideration that a larger number of smaller wind turbines results in the largest impact is supported by evidence from Johnston *et al.* (2014 and The Crown Estate (2025).

14.7.1.1 Although pre-construction surveys may involve some limited and temporary interactions with the marine environment, the potential impacts of any such activities fall well within the MDS parameters assessed for this chapter. The MDS includes activities such as WTG foundation drilling and grouting, and Offshore Cable installation which represent a conservative upper bound on seabed disturbance, and vessel presence. These MDS activities therefore encompass the environmental footprint of pre-construction survey methods, which are significantly lower in magnitude, duration, and spatial extent.

14.7.1.2 For this reason, the potential environmental interactions of pre-construction surveys are not separately assessed, as they are already inherently accommodated within the worst case assumptions underpinning the MDS for this topic.

- 14.7.1.3 The difference in timing between pre-construction surveys and construction activities does not affect the assessment because the MDS represents the maximum magnitude of change, independent of phasing or scheduling. The pre-construction surveys occur over a much shorter duration and at materially lower intensities than the MDS bounding activities, and therefore do not introduce any temporal additive effects beyond those already assessed.
- 14.7.1.4 The maximum parameters and assessment assumptions that have been identified to be relevant to Marine and Nearshore Ornithology are outlined in Table 14.18 and are in line with Chapter 3, Volume 1a.

Table 14.18: Maximum parameters and assessment assumptions for impacts on Marine and Nearshore Ornithology

| Offshore Project Phase and Activity/Impact | Maximum Design Scenario | Justification |
|--|--|---|
| Construction | | |
| Temporary habitat loss and disturbance | <p>Array Area footprint: 161 km²</p> <p>Turbine Area footprint: 141 km²</p> <p>Offshore Cable Area of Search: 47 km²</p> <p>Vessel Movements:</p> <ul style="list-style-type: none"> • Vessels on site at any one time: a total of 35 vessels (excluding helicopters) could be on site at any one time to support the offshore construction activities. • Maximum installation vessel movements: a total of up to 871 return installation vessels movements annually to support offshore construction activities. • Maximum number of Helicopters: a total of 1 helicopter could be on site at any one time to support the offshore construction activities. <p>The total temporary seabed disturbance from all components of the Offshore Project is: 12,480,875 m² (12.481km²). This includes:</p> <p>Total seabed disturbance from WTG boulder clearance and foundation installation: Seabed disturbance associated with the installation of up to 60 WTGs for Scenario 2 (no offshore substation):</p> <ul style="list-style-type: none"> • Area required for jack-up vessel installation for up to 60 WTGs; • Hybrid Gravity Base (HGB) foundations; • Number of jack-up vessel placements per WTG: 2. <p>Seabed footprint:</p> <ul style="list-style-type: none"> • Seabed disturbance per WTG boulder clearance (area includes for WTG foundation template, JUV placement and clearance): 60,000 m²; • Total seabed disturbance for WTG boulder clearance: 60,000 m² x 60 = 3,600,000 m² (3.6 km²). <p>Offshore Cable boulder clearance disturbance: Seabed disturbance associated with installation of up to 12 Array Cables to Final WTG and 12 Array Cables to Landfall for Scenario 2 (Onshore Landfall Substation):</p> <ul style="list-style-type: none"> • Maximum length of cables: 350 km; • Maximum seabed disturbance corridor width (area includes for cables, cable protection and stabilisation): 25 m; • Installation method: surface lay (across 100% of cable); • Total seabed disturbance for Offshore Cable boulder clearance: 350 km x 25 m = 8,750,000 m² (8.75 km²). <p>Exit Pit Construction: Seabed disturbance associated with HDD exit pits for Scenario 2 (Onshore Landfall Substation):</p> <ul style="list-style-type: none"> • Number of exit pits: excavation of up to 13 HDD exit pits (12 plus 1 spare) by rock cutting or grinding; • Exit pit area: 75 m x 5 m = 375 m²; | <p>Array Area footprint: The largest array area footprint leads to greatest magnitude of impact across the relevant pathways, including temporary habitat loss and disturbance on ornithological receptors.</p> <p>Turbine Area footprint: The presence of 60 WTG's leads to greatest magnitude of impact across the relevant pathways, including temporary habitat loss and disturbance on ornithological receptors.</p> <p>Offshore Cable Area of Search: The largest possible Offshore Cable Area of Search leads to greatest magnitude of impact across the relevant pathways, including temporary habitat loss and disturbance on ornithological receptors.</p> <p>Vessels on site at any one time: 35 represents the greatest amount of vessels that will be present in the Offshore Project Area at any one time and the greatest amount of vessel return trips anticipated in a year (see Chapter 3, Volume 1a for further details on vessel types).</p> <p>Maximum installation vessel movements: 871 represents the greatest amount of vessel return trips anticipated in a year (see Section 3.5.12 of Chapter 3, Volume 1a for further details on vessel types)</p> <p>Helicopters on site at any one time: 1 helicopter represents the greatest amount of vessels that will be present in the Offshore Project Area at any one time.</p> <p>Total seabed disturbance from WTG boulder clearance and foundation installation: Represents the greatest number of WTGs (including associated ground disturbance) and the longest construction duration, resulting in the greatest extent of temporary seabed habitat loss/disturbance over the longest timeframe.</p> <p>Offshore Cable boulder clearance disturbance: Represents the greatest length of cable and assumes installation via surface lay, as this method results in the largest disturbance corridor (25 m) across the greatest proportion of the cable route (100%), leading to the maximum extent of temporary seabed habitat loss/disturbance over the longest timeframe.</p> |

| Offshore Project Phase and Activity/Impact | Maximum Design Scenario | Justification |
|--|--|--|
| | <ul style="list-style-type: none"> Total seabed disturbance for HDD exit pit: $375 \text{ m}^2 \times 13 = 4,875 \text{ m}^2$ (0.004875 km²). <p>Construction vessel anchorage disturbance: Anchored vessels may be utilised during the installation of the Offshore Cables within the Offshore Project Boundary. Assumes six-point mooring system with 3 m² anchors deployed every 500m of cable.</p> <ul style="list-style-type: none"> Maximum seabed footprint per anchor: 3 m²; Maximum number of anchor drops: 700; Maximum seabed footprint: $(3 \text{ m}^2 \times 6) \times 700 = 126,000 \text{ m}^2$ (0.126 km²). <p>Repeat disturbance: Activities to install the WTGs and Offshore Cables will be undertaken within the total seabed disturbance area. However, activities will be undertaken sequentially and so result in repeat disturbance of the seabed. It has been assumed that repeat disturbance could occur for works associated with:</p> <ul style="list-style-type: none"> WTG installation: up to 1,440,000 m² (1.44 km²); Offshore Cable installation: up to 8,750,000 m² (8.75 km²); Total repeat disturbance: up to 10,190,000 m² (10.19 km²). <p>Construction programme:</p> <ul style="list-style-type: none"> Construction programme: Maximum duration of offshore construction is up to 5 years. Working hours are expected to be 24 hours, 7 days a week. Offshore construction within the Offshore Project Boundary will only be undertaken during the April-October period, except for offshore Landfall construction works located within the Landfall Exit Pit Area. Installation of WTG foundations: will be undertaken between April-October over a 2 year period, totalling 14 months of active work. <p>Duration of offshore construction: 5 years (expected to be 2028/2029 to 2032/2033)</p> <p>Further details of the MDS on temporary habitat loss and disturbance during the construction phase of the Offshore Project, as defined by the impact assessments in Chapter 11, Volume 2a and Chapter 12, Volume 2a</p> | <p>Exit Pit Construction: Represents the greatest number of HDD exit-pits leading to the maximum extent of temporary seabed habitat loss/disturbance over the longest timeframe.</p> <p>Construction vessel anchorage disturbance: Represents the maximum anchor footprint from construction vessels, leading to the maximum extent of temporary seabed habitat loss/disturbance over the longest timeframe.</p> <p>Repeat Disturbance: Represents the greatest area for repeated seabed disturbance for WTG installation (i.e. spud leg placement of jack-up vessels will occur following the boulder clearance works, this is expected to be a smaller area than the total seabed disturbance as the vessels won't disturb the prepared area), and Offshore Cable installation (i.e. cable installation will occur following the boulder clearance works, it has been assumed that repeat disturbance could occur across all of the total seabed disturbance area due to the potential number of Offshore Cables installed).</p> <p>Construction programme: Represents the maximum offshore construction duration, and parameters for construction within the Offshore Project Boundary. The more continuous the activity, the more impactful it is expected to be, as a result of longer periods when the impact is felt and shorter or no recovery.</p> <p>Duration of offshore construction: This is the maximum expected construction duration. The longer the duration of construction, the more time it will be impacting receptors.</p> |
| Indirect effects through effects on prey | Significant effects on prey species during the construction phase of the Offshore Project, as determined by the impact assessments in Chapter 11, Volume 2a and Chapter 12, Volume 2a. | |
| Response to artificial lighting | <p>Vessels on site at any one time: a total of 35 vessels (excluding helicopters) could be on site at any one time to support the offshore construction activities.</p> <p>Helicopters on site at any one time: a total of 1 helicopter could be on site at any one time to support the offshore construction activities.</p> | <p>Vessels on site at any one time: 35 represents the greatest amount of vessels that will be present in the Offshore Project Area at any one time and the greatest amount of vessel return trips anticipated in a year (see Chapter 3, Volume 1a for further details on vessel types). The more vessels that are on site at one time, the more lighting will be produced.</p> |

| Offshore Project Phase and Activity/Impact | Maximum Design Scenario | Justification |
|--|---|---|
| | <p>Maximum installation vessel movements: a total of up to 871 return installation vessels movements annually to support offshore construction activities.</p> <p>WTG Lighting: Significant Peripheral Structures require:</p> <ul style="list-style-type: none"> • Synchronised flashing IALA special mark characteristics (Fl.Y.5s); • 360° visibility; • Between 6 m and 30 m above Highest Astronomical Tide (HAT) and below arc of the rotor blades; • Minimum 5 nm range; • IALA Category 1 availability (greater than 99.8%); • Uninterrupted Power Supply (UPS) of 96 hours. <p>Intermediate Peripheral Structures require:</p> <ul style="list-style-type: none"> • Synchronised flashing yellow lights (FL.Y.2.5s) (distinct characteristic from SPS); • 360° visibility; • Between 6 m and 30 m above HAT and below arc of the rotor blades; • Minimum 2 nm range; • IALA Category 1 availability (greater than 99.8%); • UPS of 96 hours. <p>ID marker boards – Lit via low level baffled lighting Heli-hoist lights – Low intensity green light</p> <p>Number of WTG with lighting:</p> <ul style="list-style-type: none"> • Up to 30 of the WTG will require illumination (200-2000 candela (cd) red lights depending on visibility) and up to 14 navigation lights. | <p>Helicopters on site at any one time: 1 helicopter represents the greatest amount of vessels that will be present in the Offshore Project Area at any one time.</p> <p>Maximum installation vessel movements: 871 represents the greatest amount of vessel return trips anticipated in a year (see Section 3.5.12 of Chapter 3, Volume 1a for further details on vessel types)</p> <p>WTG Lighting: This is the maximum lighting assessed within Appendix 18.5: Visibility of Aviation Warning Lights, Volume 2c and Appendix 16.3, Volume 2c. These lighting parameters are included within the construction phase as once a WTG is installed there is a requirement to make sure this is fully visible for health and safety reasons. The greatest impact will occur when up to 60 WTG are installed and operational, however there will be incremental increases in lighting requirements throughout the construction phase.</p> |
| Operation and Maintenance | | |
| Collision Risk | <p>Parameters used within the CRM and mCRM (Appendix 14.3, Volume 2c and Appendix 14.4, Volume 2c) which result in the largest impact on Marine and Nearshore Ornithological receptors are provided. It should be noted that these values are often not the 'maximum' as presented within Section 3.5.8 of Chapter 3, Volume 1a. The parameters used in the CRM and mCRM align with the 'smaller WTG type' as set out in Table 3-11 of EIAR Chapter 3, Volume 1a.</p> <p>Operational lifespan: Maximum duration of O&M phase of up to 35 years.</p> <p>Smaller WTG Type:</p> <ul style="list-style-type: none"> • Number of wind turbine: Presence of up to 60 WTGs with hybrid multi-leg jacket gravity base foundations. • Rotor diameter: 236 m • Blade clearance above Mean Sea Level (MSL) (m): 30 m • Rotation speed per minute: 9.3 rpm. • Maximum Chord: 5.3 m | <p>Operational lifespan: This is the maximum expected operational lifespan of the Offshore Project. Population models are presented for the predicted length of time the Offshore Project will be in-situ and impacting the receptors. The longer the operational lifespan, the more time the Offshore Project will be impacting receptors through impact pathways such as collision.</p> <p>Smaller WTG Type: As detailed in paragraph 14.7.1.2 the maximum design scenario assumes that the configuration resulting in the greatest potential impact is the larger number of smaller wind turbines.</p> <p>Number of wind turbines: For collision, the greatest risk comes from a greater number of smaller wind turbines (60 WTG).</p> |

| Offshore Project Phase and Activity/Impact | Maximum Design Scenario | Justification |
|---|---|---|
| | | <p>Rotor diameter: For collision, the rotor diameter is a key parameter within the CRM which determines the swept area.</p> <p>Blade clearance above Mean Sea Level (MSL) (m): 30 m is the minimum blade clearance between the lowest point of the blade tip and the water level. Most seabirds fly close to the water level (Johnston <i>et al.</i>, 2014), the highest collision risk is from the lowest blade clearance.</p> <p>Rotation speed per minute: For collision, a greater risk comes from a greater maximum rotation speed which occurs when considering the smaller WTG type.</p> <p>Maximum Chord: The thickness of the blade results in a greater exposed surface area, which in turn increases the probability of a collision</p> |
| <p>Distributional responses (displacement) associated with the Offshore Project</p> | <p>Operational lifespan: Maximum duration of O&M phase of up to 35 years.</p> <p>Turbine Area footprint: 141 km²</p> <p>Offshore Cable Area of Search: 47 km²</p> <p>Maximum number of wind turbine: up to 60 WTGs.</p> <p>Vessel activity within Offshore Project Boundary during the O&M phase: <ul style="list-style-type: none"> - Maximum of 10 vessels on site at any one time - Maximum of 1 helicopter on site at any one time - Up to 32,034 total lifetime return trips to port during the 35 years of operation </p> <p>Maximum number of OSP (if required): 1 OSP</p> | <p>Operational lifespan: This is the maximum expected operational lifespan of the Offshore Project. Population models are presented for the predicted length of time the Offshore Project will be in-situ and impacting the receptors. The longer the operational lifespan, the more time the Offshore Project will be impacting receptors through impact pathways such as displacement.</p> <p>Turbine Area footprint: The presence of 60 WTG's leads to greatest magnitude of impact through displacement.</p> <p>Vessel Activity within the Offshore Project Boundary during the O&M phase: This represents the greatest number of vessels to be presented in the Offshore Project Boundary at any one time and the greatest amount of vessel return trips anticipated in a year (see Chapter 3, Volume 1a for further details on vessel types)</p> <p>Maximum number of OSP: This is the predicted largest number of OSPs that is being proposed by the Offshore Project (under Scenario 1). The greatest number of OSPs will result in the largest displacement.</p> |
| <p>Collision and displacement combined</p> | <p>The MDS used for this assessment is identical to the MDS for the Offshore Project O&M Phase and Activity Impacts 'Collision Risk' and 'Distributional responses (displacement) associated with the Offshore Project'.</p> | |
| <p>Barrier effects</p> | <p>Operational lifespan: Maximum duration of O&M phase of up to 35 years.</p> | <p>Operational lifespan: This is the maximum expected operational lifespan of the Offshore Project. Population models are presented for</p> |

| Offshore Project Phase and Activity/Impact | Maximum Design Scenario | Justification |
|--|---|---|
| | <p>Turbine Area footprint: 141 km²</p> <p>Maximum number of wind turbine: up to 60 WTGs</p> <p>Maximum number of OSP (if required): 1 OSP</p> | <p>the predicted length of time the Offshore Project will be in-situ and impacting the receptors. The longer the operational lifespan, the more time the Offshore Project will be impacting receptors through impact pathways such as collision.</p> <p>Turbine Area footprint: Barrier effects occur due to the presence of infrastructure, therefore the area over which this infrastructure is placed is a vital parameter of the barrier effects assessment.</p> <p>Maximum number of wind turbines: For barrier effects, the greatest risk comes from a greater number of wind turbines (60 smaller WTG).</p> <p>Maximum number of OSP (if required): This is the predicted largest number of OSPs that is being proposed by the Offshore Project (if required under Scenario 1). The greatest number of OSPs will result in the largest barrier effect.</p> |
| <p>Long-term habitat loss (i.e. operational duration of the project)</p> | <p>Array Area footprint: 161 km²</p> <p>Turbine Area footprint: 141 km²</p> <p>Offshore Cable Area of Search: 47 km²</p> <p>Operational lifespan: Maximum duration of O&M phase of up to 35 years.</p> <p>Presence of up to 60 WTGs and Offshore Cables: (Scenario 2 without OSP) across the project lifetime up to 35 years. Maximum long-term habitat loss = 2,411,500 m² (2.411 km²)</p> <p>WTG:</p> <ul style="list-style-type: none"> • Up to 60 WTGs; • Hybrid Gravity Base (HGB) foundations; • Seabed footprint per WTG (including foundation area and scour protection) = 105 m x 105m; Maximum long term seabed habitat loss of WTGs: (105 m x 105 m) x 60 = 661,500 m² (0.662 km²) <p>Offshore Cables:</p> <ul style="list-style-type: none"> • Cable length: 12 Array Cables to Final WTG (within the Array Area) and 12 Array Cables to Landfall (within the OCAS) equating to a maximum cable length of 350 km; • Maximum corridor width = 5 m; • Maximum long term seabed disturbance habitat loss for Offshore Cables: 350 km x 5 m = 1,750,000 m² (1.75 km²). | <p>Array Area footprint: The largest array area footprint leads to greatest magnitude of impact across the relevant pathways, including long-term habitat loss on ornithological receptors.</p> <p>Turbine Area footprint: The presence of 60 WTG's leads to greatest magnitude of impact across the relevant pathways, including long-term habitat loss on ornithological receptors.</p> <p>Offshore Cable Area of Search: The largest possible Offshore Cable Area of Search leads to greatest magnitude of impact across the relevant pathways, including long-term habitat loss on ornithological receptors.</p> <p>Operational lifespan: This is the maximum expected operational lifespan of the Offshore Project. Population models are presented for the predicted length of time the Offshore Project will be in-situ and impacting the receptors. The longer the operational lifespan, the more time the Offshore Project will be impacting receptors through impact pathways such as long-term habitat loss.</p> <p>Presence of WTGs and Offshore Cables: Represents the maximum number of WTGs, assuming the foundation type with the greatest seabed footprint, along with associated scour protection and the</p> |

| Offshore Project Phase and Activity/Impact | Maximum Design Scenario | Justification |
|--|--|--|
| | Significant effects on long-term habitat loss during the O&M phase of the Offshore Project, as determined by the impact assessments in Chapter 11, Volume 2a and Chapter 12, Volume 2a | maximum length of cables and cable protection, and thus the greatest extent of long term habitat loss. |
| Response to artificial lighting | <p>Vessel activity within Offshore Project Boundary during the O&M phase:</p> <ul style="list-style-type: none"> • Maximum of 10 vessels on site at any one time • Maximum of 1 helicopter on site at any one time • Up to 32,034 total lifetime return trips to port during the 35 years of operation <p>WTG Lighting:</p> <ul style="list-style-type: none"> • Significant Peripheral Structures require: <ul style="list-style-type: none"> - Synchronised flashing IALA special mark characteristics (Fl.Y.5s); - 360° visibility; - Between 6 m and 30 m above Highest Astronomical Tide (HAT) and below arc of the rotor blades; - Minimum 5 nm range; - IALA Category 1 availability (greater than 99.8%); - Uninterrupted Power Supply (UPS) of 96 hours. • Intermediate Peripheral Structures require: <ul style="list-style-type: none"> - Synchronised flashing yellow lights (distinct characteristic from SPS); - 360° visibility; - Between 6 m and 30 m above HAT and below arc of the rotor blades; - Minimum 2 nm range; - IALA Category 1 availability (greater than 99.8%); - UPS of 96 hours. • Number of WTG with lighting: Up to 30 of the WTG will require illumination (200-2000 candela (cd) red lights depending on visibility) and up to 14 navigation lights | <p>Vessel activity within Offshore Project Boundary during the O&M phase: This represents the greatest number of vessels to be presented in the Offshore Project Boundary at any one time and the greatest amount of vessel return trips anticipated in a year (see Chapter 3, Volume 1a for further details on vessel types). The more vessels that are on site at one time the more lighting will be produced.</p> <p>WTG Lighting: This is the maximum lighting assessed within Appendix 18.5: Visibility of Aviation Warning Lights, Volume 2c and Appendix 16.3, Volume 2c.</p> |
| Decommissioning | | |
| Temporary habitat loss and disturbance | <p>The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment. Activities equivalent to or less than the construction phase. This is because, unlike construction, seabed clearance is not expected to be required for foundation installation or along cable routes. Any seabed clearance during decommissioning is likely to be limited to the placement of jack-up vessel legs. The assumptions for the construction phase therefore apply.</p> <p>Following the operation and maintenance phase, components of the Offshore Project may be left in-situ to avoid unnecessarily disturbing the seabed (i.e. where marine habitat has formed). This could include scour protection associated with the WTG foundations and sections of the Offshore Cable. The potential for infrastructure to remain <i>in-situ</i> will be confirmed through consultation on the Decommissioning Programme to ensure the most suitable approach is taken. At</p> | Decommissioning activities within the Offshore Project Boundary are equal to or less than those carried out during the construction phase for the Offshore Project. Therefore, for the purpose of the decommissioning assessment it is assumed that the level of temporary habitat loss, disturbance and displacement is likely to be similar if not less. |

| Offshore Project Phase and Activity/Impact | Maximum Design Scenario | Justification |
|--|--|---------------|
| | <p>this stage it is unconfirmed which components (if any) would remain in-situ. As such, under the maximum design scenario for short term seabed habitat loss and/or disturbance during decommissioning it has been assumed that all infrastructure would be removed.</p> <p>Decommissioning programme: Duration is up to 5 years.</p> | |
| Indirect effects through effects on prey | Significant effects on prey species during the decommissioning phase of the Offshore Project, as determined by the impact assessments in Chapter 11, Volume 2a and Chapter 12, Volume 2a. | |
| Response to artificial lighting | The MDS used for this assessment is identical to the MDS for the Offshore Project decommissioning impact 'Temporary habitat loss and disturbance'. | |

14.7.2 EMBEDDED MITIGATION MEASURES

- 14.7.2.1 As part of the Offshore Project design process, a number of embedded mitigation measures have been adopted to reduce the potential for impacts on Marine and Nearshore Ornithology, and these have evolved over the development process as the EIA has progressed and in response to consultation.
- 14.7.2.2 The embedded mitigation 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 the embedded mitigation, and also to various standard sectoral practices and procedures, they are considered inherently part of the design of the Offshore Project and are set out in this EIA.
- 14.7.2.3 Table 14.19 sets out the relevant embedded mitigation measures within the design and how these affect the Marine and Nearshore Ornithology assessment. All of the Offshore Project commitments are also presented in Chapter 23: Summary of Offshore Mitigation/Statement of Offshore EIA Commitments, Volume 2a.

Table 14.19: Relevant Marine and Nearshore Ornithology embedded mitigation measures

| ID | Environmental Measure Proposed | Project Phase Measure Introduced | How the Environmental Measures will be Secured | Relevance to Marine and Nearshore Ornithology Assessment |
|------|--|--|--|--|
| M001 | The outputs of the project-specific site investigation surveys, will be reviewed to ensure that the final design and location of key project infrastructure takes full account of the physical environment and considers the potential for long-term changes. The mitigation hierarchy will be applied to avoid any sensitive areas identified, as far as is possible, by micro-siting wind turbine generators (WTG) and cables. | Design, pre-construction, construction | To be secured through a condition of the Section 36 consent and/or Marine Licence. | The review of site-specific investigation data allows the project design and layout to avoid sensitive marine and coastal bird habitats wherever possible. |
| M002 | A Cable Installation Plan will be produced to confirm routing, method of installation and aspects such as target Depth of Burial and need for/location of/type of external cable protection. This Plan will also contain the outputs of a formal Cable Burial Risk Assessment (CBRA). Data from the project-specific geophysical surveys will be used to identify the preferred route, with the use of natural crevasses or channels within the bedrock proposed, where feasible, and areas of thicker Quaternary sediments identified (to maximise opportunities for cable burial). | Construction | Secured in the Section 36 Consent and/or Marine Licence conditions. Details will be provided within the Cable Installation Plan. | The use of ploughing techniques or surface laying reduces the amount of suspended sediment generated compared to jet trenching. Suspended sediment can directly impact ornithological receptors and can also lead to indirect effects via impacts on prey. |

| ID | Environmental Measure Proposed | Project Phase Measure Introduced | How the Environmental Measures will be Secured | Relevance to Marine and Nearshore Ornithology Assessment |
|------|---|--|--|--|
| M004 | Accidental release of construction material and/or litter to be addressed via the development of procedures to retrieve the accidental deposit of an object at sea. | Pre-construction, construction, O&M and decommissioning | To be secured through a condition of the Section 36 consent and/or Marine Licence. | Materials and litter can directly impact ornithological receptors and can also lead to indirect effects via impacts on prey. |
| M005 | Relevant best practice techniques for seabed excavations, employed through all phases of the Offshore Project, and suspended solids monitoring to aid responsible management of excavation activities. | Construction, O&M and decommissioning | To be secured through a condition of the Section 36 consent and/or Marine Licence. | Suspended sediment can directly impact ornithological receptors and can also lead to indirect effects via impacts on prey. |
| M006 | A Invasive Non-Native Species (INNS) Management Plan will be developed prior to commencement of construction (building on the INNS Management Plan, Volume 3) in compliance with legislative requirements and/or best practice standards and guidance and adhered to. | Construction, O&M and decommissioning | Secured in the Section 36 Consent and/or Marine Licence conditions. Details will be provided within the INNS Management Plan | Indirect effects through effects on prey |
| M010 | Compliance with MGN 654 and its annexes including development and implementation of a Search and Rescue (SAR) Checklist, Emergency Response Cooperation Plan (ERCOP) and guard vessels as required by risk assessment. | Construction, O&M, and decommissioning | Secured in the Section 36 Consent and/or Marine Licence conditions. Details will be provided within the ERCOP. | Can result in temporary habitat loss and disturbance and displacement |
| M014 | Marking and lighting of the Array Area in agreement with Northern Lighthouse Board (NLB) and as per the requirements of International Association of Lighthouse | Pre-construction, Construction, O&M, and Decommissioning | To be secured through a condition of the Section 36 consent and/or Marine Licence. | Helps maintain safe navigation and clearly sets out the construction footprint, including through the use of a buoyed |

| ID | Environmental Measure Proposed | Project Phase Measure Introduced | How the Environmental Measures will be Secured | Relevance to Marine and Nearshore Ornithology Assessment |
|------|---|--|---|---|
| | <p>Authorities (IALA) Recommendation O-139 (IALA, 2021a) and Guidance G1162 (IALA, 2021b). This will include a buoyed construction area.</p> | | | <p>construction area. By keeping vessel movements predictable and routing them around marked infrastructure, the measure reduces the risk of accidental incursions and avoids unnecessary disturbance, helping to minimise displacement of marine and nearshore ornithological receptors.</p> |
| M016 | <p>Wind turbines blade clearance of at least 28.33 m above Mean High Water Springs (MHWS) (30 m above Mean Sea Level (MSL)).</p> | <p>Design, pre-construction, construction</p> | <p>To be secured through a condition of the Section 36 consent and Marine Licence.</p> | <p>The distance between the water level and lowest point of the wind turbine blade is known to be an important factor for collision risk, with typically fewer collisions predicted with increasing air draught.</p> |
| M018 | <p>The mitigation hierarchy will be applied throughout each stage of design development to avoid and reduce potential likely significant effects on Important Ecological Features (IEFs).</p> | <p>Pre-construction, construction, O&M and decommissioning</p> | <p>To be secured through a condition of the Section 36 consent and/or Marine Licence.</p> | <p>Applying the mitigation hierarchy throughout design development ensures that potential effects on Important Ecological Features (IEFs), including sensitive seabird populations are avoided or minimised as early as possible.</p> |
| M019 | <p>A final Offshore Environmental Management Plan (OEMP) will be developed prior to</p> | <p>Pre-Construction and Construction</p> | <p>Secured in the Section 36 Consent and/or</p> | <p>Developing an OEMP prior to construction ensures that all</p> |

| ID | Environmental Measure Proposed | Project Phase Measure Introduced | How the Environmental Measures will be Secured | Relevance to Marine and Nearshore Ornithology Assessment |
|------|--|---------------------------------------|---|--|
| | commencement of construction (building on Outline Offshore Environmental Management Plan, Volume 3) in compliance with legislative requirements and/or best practice standards and guidance and adhered to. | | Marine Licence via the condition for an OEMP to be submitted to MD-LOT for approval. | mitigation, monitoring, and environmental protection measures are aligned with current legislation and best-practice guidance. |
| M020 | A Decommissioning Plan will be developed prior to the construction of the Project in compliance with legislative requirements and/or best practice standards and guidance and adhered to. | Pre-Construction and Construction | Secured in the Section 36 Consent and/or Marine Licence via the condition for a Decommissioning Plan to be submitted to MD-LOT for approval and the Energy Act 2004 | Ensures that end-of-life activities are fully considered from the outset, in line with legislative requirements and best-practice guidance. This minimises potential impacts on marine and nearshore ornithological receptors. |
| M021 | Adherence to requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78/. Best practice techniques employed through all phases of the Project, and measures provided in a Marine Pollution Contingency Plan (MPCP) (see Marine Pollution Contingency Plan, Volume 3). All vessels associated with the Project will comply with IMO/MCA codes for prevention of oil pollution and, where appropriate, will have onboard Shipboard Oil Pollution Emergency | Construction, O&M and decommissioning | Secured in the Section 36 Consent and/or Marine Licence conditions. Details will be provided within the MPCP | Indirect effects through effects on prey |

| ID | Environmental Measure Proposed | Project Phase Measure Introduced | How the Environmental Measures will be Secured | Relevance to Marine and Nearshore Ornithology Assessment |
|------|---|---------------------------------------|--|---|
| | Plans (SOPEPs) (i.e. vessels over 400 gross tonnes (GT))." | | | |
| M022 | A final Navigational Safety and Vessel Management Plan (NSVMP) will be developed prior to commencement of construction (building on the Outline Navigational Safety and Vessel Management Plan, Volume 3) in compliance with legislative requirements and/or best practice standards and guidance and adhered to. | Construction, O&M and Decommissioning | Secured in the Section 36 Consent and/or Marine Licence via the condition for an NSVMP to be submitted to MD-LOT for approval. | Ensures that vessel movements are carefully controlled and managed in line with legislative requirements and best-practice guidance. Effective vessel management reduces the risk of disturbance, collision, and displacement of sensitive marine and nearshore ornithological receptors, helping minimise potential impacts during construction, O&M and decommissioning activities. |
| M023 | Offshore construction within the Offshore Project Boundary will only be undertaken during the April–October period, except for offshore Landfall construction works located within the HDD Exit Pit Area. | Construction | To be secured through a condition of the Section 36 consent and/or Marine Licence. | Ensures that disturbance does not occur during key marine ornithological receptor non-breeding seasons |
| M025 | A final Operation and Maintenance (O&M) Plan (building on Outline Operation and Maintenance Plan, Volume 3) will be developed in compliance with legislative requirements and/or best practice standards | O&M | Secured in the Section 36 Consent and/or Marine Licence via the condition for an EMP to be submitted to MD-LOT for approval. | Ensures that all routine activities, vessel movements, and maintenance procedures are managed in accordance with current legislation and best-practice guidance. This |

| ID | Environmental Measure Proposed | Project Phase Measure Introduced | How the Environmental Measures will be Secured | Relevance to Marine and Nearshore Ornithology Assessment |
|------|--|--|--|---|
| | and guidance prior to the operation of the Project and adhered to. | | | minimises potential disturbance, collision risk, and displacement of marine and nearshore ornithological receptors throughout the operational life of the project. |
| M031 | A MPCP will be developed prior to commencement of construction (building on MPCP, Volume 3) in compliance with legislative requirements and/or best practice standards and guidance and adhered to. | Design, pre-construction | Secured in the Section 36 Consent and/or Marine Licence via the condition for an MPCP to be submitted to MD-LOT for approval. | Pollution can directly impact ornithological receptors and can also lead to indirect effects via impacts on prey. |
| M033 | A Lighting and Marking Plan (LMP) will be developed prior to commencement of construction (building on the Outline LMP, Volume 3) in compliance with legislative requirements and best practice standards and guidance and adhered to. | Construction, O&M, and decommissioning | Secured in the Section 36 Consent and/or Marine Licence conditions via the condition for a LMP to be submitted to MD-LOT for approval. | The impact 'response to artificial lighting' is directly related to how the Offshore Project is lit. A legally required minimum is presumed. |
| M036 | The Project will only install Wind Turbine Generators and Offshore Substation Platform (if required) above sea infrastructure within the Turbine Area. | Pre-Construction and Construction | To be secured through a condition of the Section 36 consent and/or Marine Licence. | Limiting installation to Wind Turbine Generators and, if required, an OSP only within the defined Turbine Area ensures that construction activities remain spatially contained. This minimises the potential for additional |

| ID | Environmental Measure Proposed | Project Phase Measure Introduced | How the Environmental Measures will be Secured | Relevance to Marine and Nearshore Ornithology Assessment |
|----|--------------------------------|----------------------------------|--|---|
| | | | | disturbance or habitat displacement for marine and nearshore ornithological receptors outside the assessed footprint. |

14.8 ASSESSMENT OF EFFECTS: CONSTRUCTION PHASE

14.8.1 INTRODUCTION

14.8.1.1 As presented within Table 14.3, there are 3 scoped in effects during the construction phase, these are:

- Temporary habitat loss, disturbance and displacement (see Section 14.8.2)
- Indirect effects through effects on prey (see Section 14.8.3);
- Response to artificial lighting (see Section 14.8.4).

14.8.1.2 These 3 effects occur throughout the whole Offshore Project Boundary for the duration of the construction phase (Table 14.18).

14.8.1.3 A summary of the effects and conclusions presented for the Offshore Project alone assessment is presented in Section 14.15.

14.8.2 TEMPORARY HABITAT LOSS AND DISTURBANCE

14.8.2.1 Temporary habitat loss and disturbance of seabed habitats within the Offshore Project Boundary during the construction phase will occur as a result of construction activities, such as seabed preparation and use of jack-up vessels during wind turbine foundation installation, installation of Offshore cables and anchor placements associated with these activities. Excavated material resulting from seabed preparations, such as boulders, will be stored directly adjacent to the location of the excavation. Excavated material will comprise a mix of beach sediment and glacial till from the underlying shore platform. The assessment therefore also includes habitat loss/disturbance associated with disposal of excavated material. Construction activities may temporarily alter sediment dynamics, including increased suspended sediment concentrations (SSCs) and reduced water clarity, particularly during cable installation and foundation works. Such changes can reduce the usability of foraging habitat for seabirds by impairing prey detection. These temporary changes to habitat condition may displace marine and nearshore ornithology receptors from foraging areas within the Offshore Project Boundary.

14.8.2.2 Disturbance can be considered as indirect habitat loss, as it results in birds being unable to utilise the habitat in the area from which they have been displaced. Therefore, the impacts from both temporary direct habitat loss and indirect disturbance have been considered together.

14.8.2.3 The loss of habitat means that displaced birds may move to areas already occupied by other birds and thus may face higher intra- or inter-species competition due to a higher density of individuals competing for the same resources. Alternatively, displaced birds may be forced to move into areas of lower quality (e.g. areas of lower prey availability) or travel longer distances to reach habitat of a

suitable quality. This could therefore affect their demographic fitness (i.e. survival rates and breeding productivity), as well as potentially impacting on other birds in areas to which displaced birds move (for example by increasing competition for resources).

14.8.2.4 The displacement assessment for construction is based on a qualitative approach, considering the magnitude of impact and the sensitivity of the receptors. The species assessed for temporary habitat loss and temporary disturbance during construction are kittiwake, guillemot, razorbill, puffin, red-throated diver, great northern diver and gannet, based on their sensitivity and vulnerability scores being above medium for these impacts (Table 14.10). Note that kittiwake has a low sensitivity score, however this species has been included due to concerns raised by NatureScot around impacts from disturbance on this species (NatureScot, 2023f). All other VORs listed in Table 14.2 were scoped out of further assessment on the basis that, due to their low sensitivity scores for habitat flexibility and displacement from vessels (Table 14.10), there is negligible potential for a significant effect from temporary habitat loss or disturbance.

Magnitude

14.8.2.5 The magnitude of impact is based on the criteria detailed in Section 14.5.4 and Chapter 5: Approach to EIA, Volume 1a. A description of the likely magnitude of impact on receptors caused by each identified impact is given in the following paragraphs.

14.8.2.6 Construction activities within the Offshore Project Boundary will lead to temporary seabed habitat loss and disturbance. The MDS for this impact is taken from Chapters 12, Volume 2a and represents the scenario that would result in the greatest amount of temporary habitat loss and disturbance during the construction phase. The MDS equates to up to 12,480,875 m² (12.481 km²) of temporary habitat loss/disturbance, or 6.00% of the Offshore Project Boundary.

14.8.2.7 Of this, approximately 8,750,000 m² (8.75km²) of short term seabed habitat loss/disturbance is expected from the installation of up to 350 km of Offshore Cables (including associated seabed preparation), 4,875 m² (0.004875 km²) from HDD exit pits, 3,600,000 m² (3.6km²) from seabed preparation for WTG foundations and jack-up vessel placement and 126,000m² (0.126 km²) of seabed habitat will be disturbed over the short term from construction vessel anchorage.

14.8.2.8 In addition, up to 10,190,000 m² of repeat disturbance is expected. Repeat disturbance refers to a second phase of disturbance occurring within the same spatial footprint previously disturbed, rather than affecting new areas of seabed.

14.8.2.9 Loss of habitat during construction activities will displace birds for the duration of the construction period. Temporary loss of habitat (including habitat becoming temporarily unsuitable due to disturbance) will occur intermittently throughout the construction period. The construction period is expected to take up to 5 years, with activities and locations throughout the Offshore Project Boundary varying within this time. Construction activities will only be carried out between April and

October (inclusive), with all vessels complying with embedded mitigation measures including a vessel management plan (VMP) (see Outline Navigational Safety and Vessel Management Plan, Volume 3) to help reduce the effects of increased construction-related traffic. The timing of the works corresponds to the breeding season and post-breeding period for all VORs and other Marine and Nearshore Ornithology receptors (Table 14.14).

- 14.8.2.10 Any impacts resulting from habitat loss during construction activities are considered likely to be short-term, temporary, and reversible in nature, lasting only for the duration of construction activity, with birds expected to return to the area once construction activities have ceased in that location. Construction activities are spatially restricted to the specific area where the works are occurring. The Offshore Project Boundary is approximately 208 km² however only a small proportion will be impacted by the construction activities at any given time. This spatial restriction means that birds can freely move to different areas away from the temporary disturbance.
- 14.8.2.11 During the initial works of the construction phase, displacement is likely to be spatially restricted, occurring only in the immediate vicinity of vessels carrying out construction activities throughout the Offshore Project Boundary.
- 14.8.2.12 Embedded mitigation measures will be taken (see Table 14.19 for a list of relevant commitments measures) to reduce the magnitude of the impact. This will involve the development of a OEMP which will be adhered to in compliance with legislative requirements and best practice standards and guidance (M019). The OEMP will include measures to minimise disturbance to birds from transiting vessels such as maintaining course and speed and actively avoiding large flocks of roosting birds.
- 14.8.2.13 Best practice techniques for seabed excavations will also be employed through all phases of the Offshore Project, and suspended solids monitoring will be undertaken to aid responsible management of dredging and excavation activities (M005) to ensure that impacts remain as short-term, temporary, and reversible as possible.
- 14.8.2.14 Taking into account embedded mitigation including temporal restrictions on activity (Table 14.19), the impact is predicted to be intermittent, temporary, of local spatial extent, and of short-term duration. Only a small proportion of the Offshore Project Boundary will be affected at any one time. The impact is only predicted to affect birds directly in the vicinity of these activities and results in localised relocation to areas where construction activities are not occurring. The temporary habitat loss will be of high reversibility.
- 14.8.2.15 Therefore, the magnitude of the impact from construction activities relating to the Offshore Project is considered to be negligible, indicating that the potential is for localised habitat loss resulting in displacement that does not threaten the long-term viability of the Marine and Nearshore Ornithology receptors. The magnitude is therefore considered to be negligible for all species

assessed (kittiwake, guillemot, razorbill, puffin, red-throated diver, great northern diver and gannet) for temporary loss of habitat, and disturbance impacts.

Sensitivity of VORs

- 14.8.2.16 The sensitivity described for each receptor is based on the criteria provided in Table 14.12.
- 14.8.2.17 VORs scoped in for further assessment (as set out in Table 14.20.) could be impacted by temporary habitat loss during the construction phase. The sensitivity of a VOR to this impact depends on its ability to locate and use alternative suitable foraging habitat within its range. Birds which are divers or pursuit foragers are likely to be impacted to a greater extent due to habitat disturbance increasing suspended sediment concentrations (Darby *et al.*, 2022). Only species which have low habitat flexibility and forage in a way that increases the visual requirement (e.g. diving species) are considered vulnerable to this impact.
- 14.8.2.18 Species that can forage over a range of habitats are less vulnerable to the impact as they are able to move between areas to continue foraging. Less flexible species might be unable to forage within different environments and are then less likely to relocate and continue foraging during the temporary construction displacement.
- 14.8.2.19 The relative vulnerability of receptors to temporary habitat loss and disturbance resulting in displacement during the construction phase is summarised in Table 14.20.

Table 14.20: Vulnerability of receptors to temporary habitat loss and disturbance resulting in displacement during the construction phase

| VOR | Habitat flexibility | Recoverability | Foraging technique ³⁴ | Overall vulnerability and assessment required |
|----------------------|---------------------|----------------|----------------------------------|--|
| Kittiwake | Medium | Low | Surface feeder | No, low vulnerability as medium habitat flexibility and surface feeding. |
| Guillemot | Medium | Medium | Pursuit diver | No, medium vulnerability as medium habitat flexibility and pursuit diver |
| Razorbill | Medium | High | Pursuit diver | No, low vulnerability as high habitat flexibility and pursuit diver |
| Puffin | Medium | Medium | Pursuit diver | No, medium vulnerability as medium habitat flexibility and pursuit diver |
| Red-throated diver | Low | High | Pursuit diver | Yes, high vulnerability as low habitat flexibility and pursuit diver |
| Great northern diver | Medium | Medium | Pursuit diver | No, medium vulnerability as medium habitat flexibility and pursuit diver |

³⁴Taken from Billerman (2020)

| VOR | Habitat flexibility | Recoverability | Foraging technique ³⁴ | Overall vulnerability and assessment required |
|--------|---------------------|----------------|----------------------------------|--|
| Gannet | High | Medium | Shallow plunge diver | No, low vulnerability as high habitat flexibility and shallow feeding. |

- 14.8.2.20 VORs within Table 14.20, with the exception of red-throated diver, have a medium to high degree of flexibility in their habitat preferences. This corresponds to a medium to low vulnerability to temporary habitat loss. Red-throated diver, by contrast, is considered to have low flexibility in both habitat and prey selection, particularly during the winter months when they are more site-faithful and reliant on specific shallow coastal marine habitats (Kleinschmidt *et al.*, 2022).
- 14.8.2.21 Red-throated diver were recorded in the Survey Area year-round. While the species is known to exhibit high individual site fidelity, particularly during winter (Kleinschmidt *et al.*, 2022), studies have shown that red-throated diver can forage in both freshwater and marine environments during the breeding season, suggesting some seasonal behavioural flexibility (Duckworth *et al.*, 2021). Additionally, while their overall flexibility is lower than other VORs, recent research has shown that although red-throated diver prefer shallow, sheltered waters, their habitat use is selective but not rigid. The species has demonstrated the ability to adjust its distribution and foraging behaviour in response to environmental conditions, indicating some degree of behavioural adaptability (Duckworth *et al.*, 2024).
- 14.8.2.22 Recent evidence comparing red-throated diver populations from Scotland/*Alba*, Iceland, and Finland found that Scottish birds exhibit greater intra-individual variability in foraging strategy, with more frequent shifts between benthic and pelagic diving within foraging bouts. This suggests that Scottish red-throated diver are more behaviourally flexible than previously assumed and are capable of adapting their foraging approach depending on local prey availability (Duckworth *et al.*, 2024). This generalist foraging behaviour, even outside the breeding season, supports the conclusion that the species is not at elevated risk from temporary habitat loss and disturbance from the Offshore Project.
- 14.8.2.23 The Survey Area contains extensive areas of suitable alternative foraging habitat, and any temporary effects on the habitat are expected to be very localised. As affected seabird species typically forage over broad areas (relative to the scale of potential prey impacts) and exhibit some degree of foraging flexibility, it is considered unlikely that such impacts would meaningfully impair their ability to forage.
- 14.8.2.24 Red-throated diver are deemed to be of high vulnerability, high recoverability and international conservation value. The sensitivity of this receptor is therefore considered to be high.

Significance of effect

14.8.2.25 Overall, for all species considered in relation to temporary habitat loss and disturbance, resulting in displacement, the sensitivity of the receptors is considered to range from low to high depending on the species, while the magnitude of the impact is negligible. This results in an effect assessed as negligible to minor adverse significance. For red-throated diver, minor adverse significance is applied. For other species, where the range includes negligible to minor, negligible significance is selected based on their demonstrated behavioural flexibility and the availability of alternative habitat. A negligible to minor adverse significance is not significant in EIA terms (Table 14.13).

Further Environmental Mitigation and Residual Effect

14.8.2.26 No mitigation measures for Marine and Nearshore Ornithology are considered necessary because the likely effect in the absence of further mitigation measures (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

14.8.3 INDIRECT EFFECTS THROUGH EFFECTS ON PREY SPECIES

14.8.3.1 Underwater sound generated during construction activities such as pile driving, drilling, and vessel operations has the potential to impact prey availability for seabirds. These impulsive and continuous noise sources can cause fish and mobile invertebrates to temporarily vacate the affected area, reducing prey density within the Marine Fish Study Area (see Figure 12.1, Volume 2b). Installation of infrastructure (e.g. offshore turbines and OSP foundations (if required)) and cable trenching may also increase SSCs and localised seabed deposition, altering benthic habitats and affecting prey species.

14.8.3.2 Pile driving generates high-intensity impulsive noise that can propagate over large distances and potentially displace prey species from key foraging areas. This disruption may reduce the foraging efficiency of seabirds and lead to lower energy intake. Sediment plumes from OSP foundation drilling and cable installation may also alter benthic habitats and prey availability, particularly in areas of fine sediment where deposition can reach several centimetres. Prolonged or repeated disturbances could affect seabird productivity and survival, particularly during energetically demanding periods such as breeding or migration.

14.8.3.3 All VORs and migratory seabirds and waterbirds (see a full list in Table 14.14) can be susceptible to the indirect impact on the prey species. The maximum design scenario for SSC and sediment deposition associated with OSP (if required) and offshore wind turbine foundation installation, as well as cable trenching, has been considered when assessing prey-related impacts. These scenarios are presented in Table 14.18.

14.8.3.4 The potential effects on benthic ecology including benthic invertebrates and fish have been assessed in Chapter 11, Volume 2a and Chapter 12, Volume 2a. The conclusions from these

chapters have been incorporated into this section, which summarises their key findings and explains how they inform the assessment of potential implications for marine and nearshore ornithology through changes in prey availability.

Magnitude

- 14.8.3.5 The magnitude of impact is based on the criteria detailed in Table 14.7. The following paragraphs summarise the expected magnitude of indirect effects on Marine and Nearshore Ornithology receptors, arising from changes in prey availability associated with construction phase impacts such as seabed habitat loss, increased SSC and turbidity, underwater noise and vibration and release of drilling muds as detailed within Chapter 11, Volume 2a and Chapter 12, Volume 2a.
- 14.8.3.6 A number of potential impacts on benthic subtidal ecology (including benthic invertebrates) associated with the Offshore Project were identified in Chapter 11, Volume 2a, including disturbance during construction. The assessment identified negligible to low magnitude impact, resulting in a negligible to minor adverse significance as a result of temporary habitat loss/disturbance during construction, which is not significant in EIA terms.
- 14.8.3.7 With regards to fish, Chapter 12, Volume 2a considered the potential construction related disturbance impacts on marine fish, including key prey species such as sandeel and herring, as well as on diadromous fish. The assessment identified negligible to low magnitude impact, resulting in a minor adverse significance on all fish receptors as a result of temporary habitat loss/disturbance, increases in SSC and associated sediment deposition and underwater sound during construction, which is not significant in EIA terms.
- 14.8.3.8 Additionally with regards to prey species, although there are no embedded mitigation measures specifically aimed at minimising emissions of SSC, the adherence to industry best practice with regard to accidental release of contaminants through sediment disturbance is beneficial. Considering the embedded Offshore Project mitigation measures detailed within Table 14.19, specifically M001, M002, and M005, the magnitude of impact from increases in SSC and associated deposition and prey species during the construction phase is predicted to be Low because of its localised nature, with recovery occurring in <5 years.
- 14.8.3.9 Based on the information presented in Chapter 11, Volume 2a and Chapter 12, Volume 2a, the direct impact of construction noise on fish and mobile invertebrates is expected to be of minor adverse significance. The impact on ornithological receptors is predicted to be of local spatial extent, short-term duration, intermittent (only a small proportion of the total area will be affected at any one time, with individual elements of construction having much shorter durations), and reversible. The magnitude is therefore considered to be negligible.

Sensitivity of VORs

- 14.8.3.10 The sensitivity described for each receptor is based on the criteria provided in Table 14.12.

- 14.8.3.11 All VORs (as set out in Table 14.2) are considered in this assessment. Migratory seabirds and waterbirds are not considered further as they are generally considered to have low sensitivity to localised changes in prey availability, as individuals can exploit a wide range of foraging habitats across their migratory corridors. Given the transient nature of their presence and their broad-scale foraging behaviour, any indirect effects on prey species within the Offshore Project Study Area are unlikely to significantly impair their foraging success or overall condition.
- 14.8.3.12 All VORs, with the exception of red-throated diver, have a medium to high degree of flexibility in their habitat preferences (Table 14.9) and prey selection (Del Hoyo *et al.*, 1992). This corresponds to a medium to very low vulnerability to changes in prey availability. Red-throated diver, by contrast, is considered to have low flexibility in both habitat and prey selection, particularly during the winter months when they are more site-faithful and reliant on specific shallow coastal marine habitats (Kleinschmidt *et al.*, 2022).
- 14.8.3.13 Red-throated diver were recorded in the Survey Area year-round. While the species is known to exhibit high individual site fidelity, particularly during winter (Kleinschmidt *et al.*, 2022), studies have shown that red-throated diver can forage in both freshwater and marine environments during the breeding season, suggesting some seasonal behavioural flexibility (Duckworth *et al.*, 2021). Additionally, while their overall flexibility is lower than other VORs, recent research has shown that although red-throated diver prefer shallow, sheltered waters, their habitat use is selective but not rigid. The species has demonstrated the ability to adjust its distribution and foraging behaviour in response to environmental conditions, indicating some degree of behavioural adaptability (Duckworth *et al.*, 2024).
- 14.8.3.14 Recent evidence comparing red-throated diver populations from Scotland/*A/ba*, Iceland, and Finland found that Scottish birds exhibit greater intra-individual variability in foraging strategy, with more frequent shifts between benthic and pelagic diving within foraging bouts. This suggests that Scottish red-throated diver are more behaviourally flexible than previously assumed and are capable of adapting their foraging approach depending on local prey availability (Duckworth *et al.*, 2024). This generalist foraging behaviour, even outside the breeding season, supports the conclusion that the species is not at elevated risk from indirect effects on prey species in the context of the Offshore Project.
- 14.8.3.15 The Survey Area contains extensive areas of suitable alternative foraging habitat, and any effects on prey species are expected to be localised and temporary. As affected seabird species typically forage over broad areas (relative to the scale of potential prey impacts) and exhibit some degree of foraging flexibility, it is considered unlikely that such impacts would meaningfully impair their ability to forage.
- 14.8.3.16 With the exception of red-throated diver, all others VORs (Table 14.21) are all deemed to be of very low to medium vulnerability, with all VORs having a low to high recoverability, and local to

international conservation value. The sensitivity of these receptors is therefore considered to range between low to high sensitivity (see Table 14.21).

Table 14.21: Sensitivity of receptors to indirect effects through effects on prey species impacts during the construction phase

| VOR | Vulnerability to Changes in Prey Availability | Recoverability | Value | Sensitivity |
|-------------------------|---|----------------|---------------|-------------|
| Kittiwake | Low | Low | International | High |
| Great black-backed gull | Low | Low | International | High |
| Herring gull | Very low | Low | Local | Low |
| Arctic tern | Medium | Low | National | High |
| Guillemot | Medium | Medium | International | High |
| Razorbill | Medium | High | International | Medium |
| Puffin | Medium | Medium | International | High |
| Red-throated diver | High | High | International | High |
| Great northern diver | Medium | Medium | National | Medium |
| Fulmar | Very low | Low | National | Medium |
| Manx shearwater | Very low | High | International | Medium |
| Gannet | Very low | Medium | International | Medium |

Significance of effect

14.8.3.17 Overall, for all species considered in relation to indirect effects through effects on prey species (Table 14.21), the sensitivity of the receptors is considered low to high, while the magnitude of the impact is negligible. This results in an effect assessed as negligible to minor adverse significance, depending on the species. For kittiwake, great-black-backed gull, arctic tern, guillemot, puffin and red-throated diver, minor adverse significance is applied. For all other species, where the range includes negligible to minor, negligible significance is selected based on their demonstrated behavioural flexibility and the availability of alternative foraging habitat. A negligible to minor adverse significance is not significant in EIA terms.

Further Environmental Mitigation and Residual Effect

14.8.3.18 No mitigation measures for Marine and Nearshore Ornithology are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

14.8.4 RESPONSE TO ARTIFICIAL LIGHTING

14.8.4.1 There is the potential for artificial light associated with OWFs to impact birds at the construction, O&M, and decommissioning stages and therefore to ease readability and reduce repetition the evidence on this topic is presented combined for all phases. Paragraphs 14.8.4.2 to 14.8.4.23 present evidence that applies to all project phases. For specific evidence relating to each phase, see paragraphs 14.8.4.24 to 14.8.4.57 (construction); Section 14.9.7 (O&M); and Section 14.10.4 (decommissioning).

14.8.4.2 Seabirds may be affected by offshore lighting via phototaxis (attraction to light which could potentially operate over ranges of up to tens of kilometres) and/or disorientation (the alteration of flight paths of birds within tens of metres of artificial light) (Deakin *et al.*, 2022).

14.8.4.3 Potential impact effects may also be positive: artificial lighting may attract prey close to the sea surface, increasing foraging opportunities and prey availability – many fisheries specifically use artificial light to attract prey (Deakin *et al.*, 2022).

14.8.4.4 However, under specific conditions, lights may potentially attract seabirds and/or modify the behaviour of seabirds in their proximity. This may potentially increase collision risk and unnecessary energy expenditure for affected seabirds, for example by causing circling behaviour around very bright light sources (Deakin *et al.*, 2022).

14.8.4.5 For OWFs during the construction and decommissioning phases, construction and support vessels often use large-scale, continuous, broad-spectrum lighting for operational and safety reasons during the hours of darkness. In the O&M phase, light sources include wind turbines, associated infrastructure, and vessel lighting. It is a requirement for navigational and aviation safety that OWFs include safety lighting (navigation and aviation). The impacts on birds of artificial lighting in the O&M phase are expected to be the same as, or less than, the impacts at the construction phase, as the construction phase is expected to involve greater light levels (Deakin *et al.*, 2022).

14.8.4.6 There are significant knowledge gaps regarding the effects of artificial lighting associated with OWFs on seabirds. These include:

- The range over which light attraction may occur (and therefore the size of the light catch basin for wind farms and related activities or infrastructure);
- The extent to which light attraction is exacerbated by particular meteorological conditions (e.g. fog, rain);
- The influence of wavelength and pattern of illumination (flashing/steady);
- The extent to which light attraction differently affects adults and juveniles and for how long after fledging juveniles may remain particularly susceptible to light attraction.

14.8.4.7 As set out in the Outline Lighting and Marking Plan, Volume 3 lighting associated with the Offshore Project will meet minimum legal requirements, as set out in Section 1.3 of Outline

Lighting and Marking Plan, Volume 3. The Offshore Project lighting will not exceed the minimum legal requirements; this will minimise the risks of birds becoming attracted to or disorientated by turbines at night or in poor weather by not using brighter/more intense light than legally required.

14.8.4.8 Appropriate lighting, in line with MCA (2021) guidance and International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) Recommendation O-117 on 'The Marking of OWFs' for navigation lighting and by the Civil Aviation Authority in the Air Navigation Orders (CAP 393 and guidance in CAP 764), will ensure the offshore structures are visible for search and rescue and emergency response procedures. In addition, marine navigational lighting for the OSP (if required) will be fitted at the platform level on significant peripheral structures.

14.8.4.9 In terms of attraction to WTGs (and therefore during the O&M phase), the worst-case scenario for the Offshore Project would involve 60 WTGs and 1 OSP. Of the 60 turbines, 30 structures would be fitted with lighting requirements for aviation and shipping. The indicative lighting design, as presented in Outline Lighting and Marking Plan, Volume 3, is:

- Flashing yellow 5s lights on Significant Peripheral Structures with minimum 5nm range, 360° visibility, located between 6 and 30 m above HAT, all synchronised;
- Flashing yellow 2.5s lights on Intermediate Peripheral Structures with minimum 2nm range, 360° visibility, located between 6 and 30 m above HAT;
- For ID marker boards – lit via low level baffled lighting readable by an observer stationed 3m above sea level at 150 m from the WTG;
- Aviation warning lights – red 2,000 cd (when visibility is <5 km) dimmable to 200 cd (when visibility >5 km), off during day, 360° visibility, synchronised flashing Morse "W";
- Search and rescue lights – red 200 cd, steady when in use at the MCA's request, switched off otherwise, 360° visibility; and
- Heli-hoist lights – low intensity green light, off when not safe for heli-hoist, flashing when being prepared, steady when ready, 360° visibility.

14.8.4.10 The construction hours are anticipated to be 24 hours a day between April and October each year, for 5 years (Table 14.18). During this period, the average night length is from 13.75 hours in October down to 6 hours in June. It is anticipated that the working lights would only be on during nocturnal hours and not continuously, reducing the potential impact on species.

14.8.4.11 White light is likely to have the greatest impact on seabirds (which occurs from construction vessels), as it encompasses all wavelengths of light (Department of Climate Change, Energy, the Environment, and Water (DCCEEW), 2023). Studies investigating how different light wavelengths may affect light attraction for procellariiformes have invariably been carried out on fledglings departing natal colonies, or when carried out on adults, only for individuals returning/departing colonies overland in close proximity to breeding burrows and for high-intensity, short-range light

sources (e.g. street lighting, vehicle lights, vessel deck and search lights, cruise ships, fishing vessels, and gas flares) (Rodríguez *et al.*, 2022).

- 14.8.4.12 These studies therefore have very limited applicability to birds engaged in different behaviours (e.g. migrating, foraging, resting) encountering the lights of OWFs away from breeding colonies, and doing so in different contexts (e.g. not encountering them constantly or regularly to visit a burrow to incubate or feed chicks).
- 14.8.4.13 These studies suggest that Manx shearwater may have greater sensitivity to light of shorter wavelengths (blue/green) than longer wavelengths (red), with responses to red light the same as to no light (Syposz *et al.*, 2021). This is also consistent with the fact that Manx shearwater forage at depths of up to 55 m (Shoji *et al.*, 2016): light of shorter wavelengths (blue/green) penetrates water to greater depths than that of longer wavelengths (red), so to maximise visual acuity when foraging at depth, Manx shearwater photoreceptors likely have greater sensitivity to blue light over red (Deakin *et al.*, 2022).
- 14.8.4.14 Storm petrel and fulmar dive to a very limited degree (maximum 5 m), so likely have less need for enhanced sensitivity to blue light (Garthe and Furness, 2001; Albores-Barajas *et al.*, 2011; Delord *et al.*, 2016; Deakin *et al.*, 2022). However, petrel vision is most sensitive to light in the short-wavelength blue (400 nm to 500 nm) region of the visible spectrum (DCCEEW, 2023). Relative to diurnal seabirds, such as gulls and terns, petrels have a higher number of short-wavelength-sensitive cones, thought to be an adaptation that increases prey visibility against blue water for foraging (Hart, 2001; DCCEEW, 2023).
- 14.8.4.15 Given this likely sensitivity of procellariiformes to short-wavelength light, the use of red lighting for aviation warning (Table 14.18) is likely to minimise any potential light attraction impacts compared to using white, blue, or green light. This is because white, blue, or green light appears to be more detectable for Procellariiformes, potentially increasing light attraction impacts. In contrast, red light appears less detectable, indistinguishable from darkness (Syposz *et al.*, 2021), suggesting it is less likely to impact birds.
- 14.8.4.16 Low-intensity, baffled lighting and flashing rather than steady signals are likely to further reduce potential light impacts, as seabirds appear to be more strongly attracted to bright, continuous, and shorter-wavelength light (Rodríguez *et al.*, 2017; Deakin *et al.*, 2022).
- 14.8.4.17 The Scottish Government's review of OWF impacts on petrels and shearwaters (Deakin *et al.*, 2022) examines the potential for attraction in nocturnally active procellariiformes, with a focus on offshore infrastructure. However, whilst Deakin *et al.* (2022) provides a comprehensive review of seabird attraction to artificial light, the review does not account for the characteristics of lighting associated with OWFs. The review highlights the attraction of seabirds to light sources such as village lights, lighthouses, and hydrocarbon platforms. It is notable that the intensity of light associated with these sources is significantly greater than that associated with an OWF. This was

highlighted by Furness (2018), who determined that the intensity of lighting on wind turbines is in orders of magnitude lower than light intensities produced by ports, towns, lighthouses, oil and gas platforms, or ships. Furness (2018) concluded that the lights associated with OWFs and wind turbines are unlikely to have any detectable effect on birds.

- 14.8.4.18 Furness (2018) found that phototaxis of seabirds only occurs over short distances (hundreds of metres) in response to bright white light close to colonies of these species. It is not seen over large distances or with the moderate light levels used in obstruction or navigation lighting. In addition, no evidence was found to suggest that obstruction or navigation lights affect the ability of marine birds to feed at night, or attract marine prey animals to aggregate, or that they could affect predation risk for nocturnal migrant birds. No evidence was found to suggest that obstruction or navigation lights cause displacement of marine birds due to avoidance of light.
- 14.8.4.19 The assessment for attraction to light is based on a qualitative approach, considering the magnitude of impact and the sensitivity of the receptor. The species considered for attraction to light are identified in Table 14.22 based on the species vulnerability (Wade *et al.*, 2016; Bradbury *et al.*, 2014) and abundance at the Offshore Project (see Appendix 14.1, Volume 2c).
- 14.8.4.20 In order to identify VORs and migratory seabirds that require assessment, the amount of flight activity at night exhibited by each species as reported by Wade *et al.* (2016) has been used as a coarse filter. Where a species has a high flight at night score (4 or above), the species is included in the assessments presented in this report. Where a species has a flight at night score of low (1) or moderate (2 or 3), it is considered that an impact pathway does not exist as the species will not exhibit enough activity at night to result in a measurable impact.
- 14.8.4.21 It is acknowledged that the use of flight activity at night is not analogous with an attraction to light sources. However, the use of flight activity at night is precautionary, as whilst it may identify species that are not attracted to light for consideration in the assessment, it will not omit those species that might be attracted to light and that therefore may be impacted by light associated with the Offshore Project.
- 14.8.4.22 However, as a further precautionary step, Manx shearwater has been screened in for assessment despite a moderate flight activity at night score (3). Whilst Manx shearwater does not meet the criteria for consideration, there is evidence showing that the species is attracted to light (Deakin *et al.*, 2022).

Table 14.22: Identification of VORs and migratory seabirds for which assessments in relation to attraction to light is required

| Receptor | Flight Activity at Night | Flight activity at night score | Value of VOR at Offshore Project | Assessment Required (Yes/No) |
|-----------|--------------------------|--------------------------------|----------------------------------|--|
| Kittiwake | Moderate | 3 | International | No, moderate flight activity at night. |

| Receptor | Flight Activity at Night | Flight activity at night score | Value of VOR at Offshore Project | Assessment Required (Yes/No) |
|-------------------------|--------------------------|--------------------------------|----------------------------------|---|
| Herring gull | Moderate | 3 | International | No, moderate flight activity at night. |
| Great black-backed gull | Moderate | 3 | Local | No, moderate flight activity at night. |
| Little gull | Moderate | 2 ³⁵ | Local | No, moderate flight activity at night. |
| Sandwich tern | Low | 1 | Regional | No, low flight activity at night. |
| Little tern | Low | 1 | National | No, low flight activity at night. |
| Common tern | Low | 1 | National | No, low flight activity at night. |
| Arctic tern | Low | 1 | National | No, low flight activity at night. |
| Arctic skua | Low | 1 | Regional | No, low flight activity at night. |
| Great skua | Low | 1 | International | No, low flight activity at night. |
| Pomarine skua | Low | 1 | Local | No, low flight activity at night. |
| Long-tailed skua | Low | 1 | Local | No, low flight activity at night. |
| Guillemot | Moderate | 2 | International | No, moderate flight activity at night. |
| Razorbill | Low | 1 | International | No, low flight activity at night. |
| Puffin | Low | 1 | International | No, low flight activity at night. |
| Red-throated diver | Low | 1 | International | No, low flight activity at night. |
| Great northern diver | Low | 1 | National | No, low flight activity at night. |
| Storm petrel | High | 4 | International | Yes, high flight activity at night. |
| Leach's petrel | High | 4 | International | Yes, high flight activity at night. |
| Fulmar | High | 4 | National | Yes, high flight activity at night. |
| Manx shearwater | Moderate | 3 | International | Yes. Whilst the species does not meet the criteria for consideration, there is evidence showing that the species is attracted to light (Deakin et al., 2022). |
| Gannet | Moderate | 2 | International | No, moderate flight activity at night. |

³⁵ Flight activity at night score for little gull is taken from Bradbury *et al.* (2014) as little gull is not included in Wade *et al.* (2016).

14.8.4.23 Considering the potential for response to artificial lighting, the VORs and migratory seabirds taken through to assessment are storm petrel, Leach's petrel, fulmar, and Manx shearwater.

Magnitude of impact

14.8.4.24 Precise numbers of birds moving through the Offshore Project Boundary during the hours of darkness are unknown. For species of national or international value, proportions travelling through the Offshore Project Boundary are likely to be low as few species are predominately nocturnal (see Table 14.22). The magnitude of impact is therefore considered qualitatively for all receptors.

14.8.4.25 The nature of lighting at the Offshore Project is not considered comparable to the light sources associated with significant attraction events (e.g. those that may occur at lighthouses or other significant light sources), representing a much lower risk due to lower light intensity, the colour of the light, and the context in which the light may be encountered.

14.8.4.26 As stated in Table 14.19, the project design seeks to minimise the impacts of attraction to light through the inclusion of embedded mitigation measures.

14.8.4.27 Regarding possible attraction to the light associated with OWF construction vessels, Deakin *et al.* (2022) note that it in the context of recorded attraction to vessels (usually fishing vessels), it has not been feasible to differentiate between potential causes of the attraction – whether it was due to olfaction, low frequency sounds, visual cues associated with a food source, and/or light (with the lighting associated with fishing vessels being significantly brighter than for construction vessels). Dupuis *et al.* (2021) argue that apparent seabird attraction to fishing boat lights may actually be primarily due to olfaction, with birds more attracted by the fishing activity itself than by the light. There is no evidence from any existing OWFs that suggests that mass attraction events occur as a result of vessel lighting at any OWF stage.

14.8.4.28 Similarly, there is no evidence from any existing OWFs that suggests that mass attraction events occur as a result of the typical navigational and aviation lighting for OWFs. Furness (2018) concluded that the evidence indicates that obstruction or navigation lights on wind turbines will have no significant effects on marine birds.

14.8.4.29 A total of 4 species were scoped into assessment (fulmar, Manx shearwater, Leach's petrel and storm petrel) and specific evidence to the potential magnitude of impact on that species is presented in the following paragraphs.

Fulmar

14.8.4.30 There is limited evidence for the effects of artificial lighting on fulmar, including in relation to lighting associated with any stage of OWFs. Dupuis *et al.* (2021) state that they did not find any evidence in the literature that the lights of wind turbine fields attract fulmar. Atchoi *et al.* (2020)

also state that, to the best of their knowledge, surface-nesting petrels such as fulmars or albatrosses have not been recorded at fallout events nor in light attraction events at sea.

14.8.4.31 The impact is predicted to be of local spatial extent, intermittent, and of medium-term duration, and will affect any birds in the vicinity of these activities directly. The impact will also be of high reversibility. The magnitude is therefore considered to be negligible.

Manx shearwater

14.8.4.32 As with other seabirds that rear their young underground, Manx shearwater appear to be particularly sensitive to light-induced attraction and disorientation. Adults leave the fully-grown chick to fledge independently, typically just after dark. The chicks use natural light gradients to navigate from the burrows to the sea.

14.8.4.33 Several studies have recorded fledgling Manx shearwater being attracted to artificial lights and subsequently becoming grounded or colliding with structures (e.g. Miles *et al.*, 2010; Fontaine *et al.*, 2011; Rodríguez *et al.*, 2012a–c, 2015a–b; Wilhelm *et al.*, 2013; Gineste *et al.*, 2017). Such impacts have been significant for some colonies near intense lighting (such as lighthouses or coastal towns). However, overall, Manx shearwater fledgling mortality linked to artificial lighting remains low (Furness, 2018).

14.8.4.34 Furthermore, these light-induced impacts are limited to fledglings during a short period in late summer. Adults are not regularly recorded grounded. OWFs (including the Offshore Project) are located far from Manx shearwater colonies; for the Offshore Project, the nearest SPA with breeding Manx shearwater is St Kilda (102.9 km away). This distance means that fledglings are highly unlikely to encounter artificial lighting associated with the Offshore Project, and adult birds are not expected to be affected (Furness, 2018).

14.8.4.35 Importantly, many examples of artificial lighting impacts for Manx shearwater involve intense light sources such as bonfires, cities, or gas flares. These sources are not comparable to the relatively low-intensity lighting associated with OWFs (Furness, 2018). OWF lighting is 1 or 2 orders of magnitude less intense than sources such as lighthouses.

14.8.4.36 Whilst Deakin *et al.* (2022) explore potential impacts from offshore wind developments, artificial light is only briefly mentioned, and no information is provided on light characteristics from such developments.

14.8.4.37 The impact is predicted to be of local spatial extent, intermittent, and of medium-term duration, and will affect any birds in the vicinity of these activities directly. The impact will also be of high reversibility. The magnitude is therefore considered to be negligible.

Storm petrel and Leach's petrel

- 14.8.4.38 Storm petrel and Leach's petrel both have relatively high flight-at-night activity (4 out of 5 in Wade *et al.*, 2016). Adult storm petrel and Leach's petrel appear to be largely unaffected by artificial lights in general (Furness, 2018). Additionally, the percentage of flights at risk height are very low for both storm petrel and Leach's petrel (Wade *et al.*, 2016). As a result, Wade *et al.* (2016) give an overall low vulnerability score for collision risk for storm petrel and Leach's petrel.
- 14.8.4.39 Deakin *et al.* (2022) notes that petrels may be particularly at risk from light attraction and disorientation. Although there is substantial evidence indicating that petrels can be strongly and negatively impacted by artificial light, this evidence typically relates to land-based sources or intense coastal lighting. Most examples of effects of artificial light on seabirds are from events or sources that produce particularly bright light, such as bonfires, gas flares, or cities. These light sources are not analogous to the much less intense lighting associated with offshore wind farms, which is often 1 or 2 orders of magnitude less intense (Furness, 2018). It is therefore considered highly unlikely that the lower-intensity, offshore-specific lighting associated with wind farms and construction vessels would result in similar effects. Evidence also suggests that juvenile petrels are at higher risk of light attraction, potentially due to having lesser-developed retinas than adults (Wilhelm *et al.*, 2021; Burt, 2022). For example, Burt (2022) found that turning off the lights at a fish plant significantly decreased Leach's petrel strandings at that site, noting that the peak stranding period coincided with the fledging period of Leach's petrel. Storm petrel and Leach's petrel are burrow nesters and produce a single chick. Fledging occurs at night and, like other procellariiform seabirds, chicks use natural light gradients to navigate to the sea. Bright artificial light can interfere with this process and can cause grounding and collision (Rodríguez *et al.*, 2017, 2022). Some studies have recorded significant numbers of grounded fledglings (Furness, 2018). However, most studies relate to colonies in close proximity to bright lights and show low levels of impact. This impact is restricted to fledglings and limited to a short period in the year. Adults appear to be largely unaffected by artificial lights in general (Furness, 2018). Offshore wind farms are located at distances from colonies that mean fledglings would be unlikely to encounter associated artificial light, and adults do not appear to be vulnerable to artificial light. The nearest breeding records of storm petrel and Leach's petrel to the Offshore Project are on the Flannan Isles, approximately 33 km away, where there are an estimated 376 and 229 pairs respectively (Burnell *et al.*, 2023).
- 14.8.4.40 The impact is predicted to be of local spatial extent, intermittent, and of medium-term duration, and will affect any birds in the vicinity of these activities directly. The impact will also be of high reversibility. The magnitude is therefore considered to be negligible.

Sensitivity of receptors

- 14.8.4.41 The sensitivity described for each receptor is based on the criteria provided in Table 14.12.

Fulmar

- 14.8.4.42 Fulmar has a high level of nocturnal flight activity (4 out of 5 in Wade *et al.*, 2016), which is likely due to the long duration of foraging trips undertaken by the species. Fulmar therefore has the potential to interact with artificial lighting. However, very few flights are likely to be at risk height (Wade *et al.*, 2016). Wade *et al.* (2016) give an overall collision risk vulnerability score of zero for fulmar.
- 14.8.4.43 Furthermore, the vulnerability of this species to lighting effects will be reduced due to the low levels of artificial light generated by the Offshore Project. The species is therefore considered to have low vulnerability.
- 14.8.4.44 Fulmar has a low reproductive potential, due to laying a single egg per breeding attempt, and a typical age of recruitment of 9 years. The UK population of fulmar increased by 77% between 1969 to 1970 to 1985 to 1988. However, since then, fulmar populations have decreased in both UK and Scottish contexts (Burnell *et al.*, 2023). Fulmar is therefore deemed to have low recoverability (Table 14.9).
- 14.8.4.45 Fulmar is a qualifying interest for several SPAs likely to be connected to the Offshore Project (within the mean-max + SD foraging range). The species is therefore considered to be of international value. Refer to Table 14.17 for details of SPAs with connectivity to the Offshore Project with regards to fulmar.
- 14.8.4.46 Fulmar is considered to have low vulnerability to artificial lighting, low recoverability, and international value. Sensitivity is therefore considered to be high.

Manx shearwater

- 14.8.4.47 Manx shearwater has moderate nocturnal flight activity (3 out of 5 in Wade *et al.*, 2016), which could result in a degree of interaction with artificial light, although the risk remains limited.
- 14.8.4.48 Manx shearwater has relatively low reproductive potential, breeding from 5 to 6 years of age and producing a single egg per season (Brooke, 2004). However, Manx shearwater populations have remained stable or have increased since the 1990s, especially on predator-free islands, and they appear largely unaffected by the 2022–2023 HPAI outbreaks (Pearce-Higgins *et al.*, 2023). Recoverability is therefore considered to be high (Table 14.9).
- 14.8.4.49 Manx shearwater is a qualifying interest for several SPAs likely to be connected to the Offshore Project (within the mean-max + SD foraging range). The species is therefore considered to be of international value. Refer to Table 14.17 for details of SPAs with connectivity to the Offshore Project with regards to Manx shearwater.
- 14.8.4.50 Manx shearwater is considered to have low vulnerability to artificial lighting, high recoverability, and international value. Sensitivity is therefore considered to be medium.

Storm petrel and Leach's petrel

- 14.8.4.51 Storm petrel and Leach's petrel both have relatively high flight-at-night activity (4 out of 5 in Wade et al., 2016). Adult storm petrel and Leach's petrel appear to be largely unaffected by artificial lights in general (Furness, 2018). Additionally, the percentage of flights at risk height are very low for both storm petrel and Leach's petrel (Wade et al., 2016). As a result, Wade et al. (2016) give an overall collision risk vulnerability score of low for storm petrel and Leach's petrel.
- 14.8.4.52 Leach's petrel has low reproductive potential due to laying a single egg per breeding attempt and their typical age of recruitment of 5 years. There is limited information on population trends for Leach's petrel, but the species is known to have declined by 79% in a national context between 1998 to 2002 and 2015 to 2021 (Burnell et al., 2023). Populations have declined in some areas as a result of predation and light pollution (Mitchell et al., 2004; Bolton et al., 2010). Recoverability is therefore considered to be low (Table 14.9).
- 14.8.4.53 Storm petrel also has low reproductive potential due to laying a single egg per breeding attempt and their typical age of recruitment of 4 to 6 years. There is limited information on population trends for storm petrel, but the species is known to have increased by 41% in a national context between 1998 to 2002 and 2015 to 2021 (Burnell et al., 2023). Recoverability is therefore considered to be high (Table 14.9).
- 14.8.4.54 The Offshore Project is within the foraging range of these species from several SPAs; therefore, both storm petrel and Leach's petrel are considered to be of international value. Refer to Table 14.17 for details of SPAs with connectivity to the Offshore Project with regards to storm petrel and Leach's petrel.
- 14.8.4.55 Leach's petrel and storm petrel are considered to have low vulnerability to artificial lighting, low (Leach's petrel) or high (storm petrel) recoverability, and international value. Sensitivity of both species is therefore considered to be high (Leach's petrel) and medium (storm petrel).

Significance of effect

- 14.8.4.56 For the Offshore Project, the species considered in relation to response to artificial lighting during the construction phase (fulmar, Manx shearwater, storm petrel, and Leach's petrel) show varying sensitivities, with Manx shearwater and storm petrel assessed as having medium sensitivity, and fulmar and Leach's petrel as having high sensitivity, while the magnitude of impact considered negligible for all species. For species with high sensitivity, a minor adverse significance is concluded. For species where the range includes negligible to minor, negligible significance is applied. This reflects the very low-intensity lighting associated with construction activities, the distance from breeding colonies, the short seasonal window when fledglings may be vulnerable, and the fact that adults are generally unaffected. A negligible adverse significance is therefore

considered appropriately precautionary. The effect therefore ranges from negligible to minor adverse significance based on the species, and is not significant in EIA terms.

Further Environmental Mitigation and Residual Effect

14.8.4.57 No additional mitigation measures for any receptors are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

14.9 ASSESSMENT OF EFFECTS: OPERATION AND MAINTENANCE

14.9.1 INTRODUCTION

14.9.1.1 As presented within Table 14.3, there are 6 effects scoped in effects during the O&M phase, these are:

- Collision risk (see Section 14.9.2);
- Distributional responses (displacement) associated with the Offshore Project (see Section 14.9.3);
- Collision and displacement combined (see Section 14.9.4);
- Barrier effects (see Section 14.9.5);
- Long-term habitat loss (i.e. operational duration of the project) (see Section 14.9.6);
- Response to artificial lighting (see Section 14.9.7);

14.9.1.2 These 6 effects occur throughout the whole Offshore Project Boundary for the duration of the O&M phase (Table 14.18).

14.9.1.3 A summary of the effects and conclusions presented for the Offshore Project alone assessment is presented in Section 14.15.

14.9.2 COLLISION RISK

14.9.2.1 During the O&M phase of the Offshore Project, the turning rotor blades of the wind turbines may present a risk of collision for seabirds. Stationary structures, such as the tower, nacelle or when rotors are not operating, are not expected to result in a material risk of collision. When a collision occurs between the turning rotor blade and the bird, it is assumed to result in direct mortality of the bird, which potentially could result in population level impacts.

14.9.2.2 The ability of seabirds to detect and manoeuvre around wind turbine blades is a factor that is considered when modelling and assessing the risk (Ozsanlav-Harris *et al.*, 2023). In response to this, it is standard practice to calculate differing levels of avoidance for different species or species groups. Avoidance rates are applied to CRMs to predict levels of impact more realistically, based on

available literature and expert advice about seabird behaviour and their flight response to wind turbines.

- 14.9.2.3 Species differ in their susceptibility to collision risk, depending on their flight behaviour and avoidance responses, and the vulnerability of their populations (Bradbury *et al.* 2014; Wade *et al.*, 2016; Ozsanlav-Harris *et al.*, 2023). As sensitivity to collision differs considerably between species, species were screened and progressed for assessment of significance on the basis of the importance of the population of each species recorded within the Marine and Nearshore Ornithology Study Area and consideration of their perceived risk from collision (Bradbury *et al.*, 2014; Wade *et al.*, 2016; Ozsanlav-Harris *et al.*, 2023).
- 14.9.2.4 As set out in Table 14.3, 7 regularly occurring seabird species were identified as potentially at risk of collision due to their recorded abundance in the Turbine Area and their high vulnerability to collision (Bradbury *et al.*, 2014; Wade *et al.*, 2016): kittiwake, great black-backed gull, herring gull, Arctic tern, fulmar, Manx shearwater, and gannet. Modelling for these species is provided in Appendix 14.3, Volume 2c. Additionally, consideration was given to species that may not have been accurately captured during traditional baseline DAS. This included migratory seabirds and waterbirds, with modelling for these species groups provided in Appendix 14.4, Volume 2c.
- 14.9.2.5 The magnitude of impact can be quantified by calculating how the additional mortality resulting from collision alters the baseline mortality rate. This was determined by calculating the estimated number of collisions with the wind turbines and the resulting percentage point increase in the baseline mortality rate of the relevant regional population.
- 14.9.2.6 There is the potential that aviation and navigation lighting on wind turbines might attract seabirds and thus increase the risk of collision. Conversely, aviation and navigation lighting could deter birds from moving through the Turbine Area. A review of available literature pertinent to this risk is covered in Section 14.9.7. Based on that review, it is considered that there is insufficient evidence to support any form of quantitative modification to the CRM process, and that overall the impact of the type of lighting installed on offshore wind turbines (i.e. red lights of relatively low brightness) is expected to be negligible.
- 14.9.2.7 CRM for regularly occurring species was undertaken using the “StochLAB” sCRM developed by Marine Scotland (Caneco *et al.*, 2022). The User Guide for StochLAB provided by Marine Scotland (Caneco *et al.*, 2022) has been followed for the modelling of collision impacts predicted for the Turbine Area. The full methodology and results are provided in Appendix 14.3, Volume 2c.
- 14.9.2.8 For all regularly occurring species, the assessment has been carried out on the basis of the input parameters recommended by NatureScot (2025b). However, it should be noted that there is considerable uncertainty around several of the key input parameters, including flight speed and avoidance rates. Therefore, in addition to the assessment value, a range of other input parameters has also been considered, as detailed in Appendix 14.3, Volume 2c. The minimum and maximum

collision estimates from this range are also presented. However, these do not represent the Applicant's position and only highlight the level of uncertainty surrounding the NatureScot advocated rates. Discussion is provided in Appendix 14.3, Volume 2c around the uncertainty in parameters, including consideration of where it is felt that parameter values other than those advocated by NatureScot are justified.

- 14.9.2.9 In accordance with NatureScot guidance (NatureScot, 2025b), this assessment presents Band (2012) Option 2 only. Band Option 2 utilises generic flight height data thus acknowledging the difficulties with collecting robust site-specific flight height information. Generic data for the proportion of birds at risk height are taken from Johnston *et al.* (2014).
- 14.9.2.10 It is acknowledged that migratory passage movements may not be adequately captured by traditional survey methods. Therefore, mCRM was also carried out. For migratory waterbirds, this was carried out using the new stochastic avian migration collision risk model developed under a Marine Scotland contract by HiDef Aerial Surveying Limited and DMP statistics (mCRM authors, 2021), whilst for migratory seabirds, a "broad front" approach was used, with collision modelling carried out using the Band (2012) CRM.
- 14.9.2.11 The methodology and detailed results of the CRM for migratory waterbirds and seabirds are provided in Appendix 14.4, Volume 2c. The full model outputs for the 7 species scoped into the assessment (Table 14.3) are presented in Appendix 14.3, Volume 2c.
- 14.9.2.12 The following sections provide a summary of the CRM results for each of the 7 species, along with the estimated results for migratory waterbirds and seabirds.

Kittiwake

Magnitude

- 14.9.2.13 The magnitude of impact is based on the criteria detailed in Table 14.7. When using the parameters recommended by NatureScot (2025b) the mean predicted number of kittiwake collision mortalities is 13.97 individuals in the pre-breeding season, 0.89 individuals in the breeding season and 6.69 individuals in the post-breeding season. This is an increase in the baseline mortality rate of 0.002 percentage points in the pre-breeding season, less than 0.001 percentage points in the breeding season and less than 0.001 percentage points in the post-breeding season. On an annual basis, the mean number of mortalities is 21.55 individuals, which is an increase in baseline mortality rates of 0.002 percentage points (Table 14.23).

Table 14.23: Assessment of predicted collision mortality estimates for kittiwake on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Collision Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|---------------|---|--------------------|------------------------------------|--|
| Breeding | 221,825 | 0.156 | 0.89 (0.22–0.89) | <0.001 (<0.001–<0.001) |
| Post-breeding | 911,586 | | 6.69 (1.62–6.69) | <0.001 (<0.001–<0.001) |
| Pre-breeding | 691,526 | | 13.97 (3.39–13.97) | 0.002 (<0.001–0.002) |
| Annual | 911,586 | | 21.55 (5.21–21.55) | 0.002 (<0.001–0.002) |

14.9.2.14 The impact is predicted to be of local spatial extent. The impact is expected to occur for the lifespan of the Offshore Project, and although it is reversible following decommissioning of the Offshore Project, it is considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. Using both the range (as presented in Appendix 14.3, Volume 2c) and the rates recommended by NatureScot (2025b), the increase in mortality is well below 0.02 percentage points in each season and also on an annual basis. Therefore, the magnitude of impact is considered to be negligible.

Sensitivity of VOR

14.9.2.15 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.

14.9.2.16 Kittiwake was rated as highly vulnerable to collision impacts by Wade *et al.* (2016), due to the proportion of flights likely to occur at potential risk height and percentage of time in flight. In terms of nocturnal activity rate, kittiwake is considered to have a medium rate of activity at night with a score of 3 (out of 5) (Wade *et al.*, 2016). Therefore, kittiwake is considered to have high vulnerability to collision (Table 14.10).

14.9.2.17 Kittiwake lay 2 eggs and breed from the age of 4 onwards, typically living on average for 12 years (Burnell *et al.*, 2023). Kittiwake have undergone decreases of approximately 57% in Scotland/*Alba* since the early 2000s. Surveys managed by the RSPB in 2023 have recorded indicative increases of 8% across a number of sites in Britain in 2023 when compared against a pre-HPAI baseline (Tremlett *et al.*, 2024). Overall, kittiwake is deemed to have low recoverability (Table 14.9).

14.9.2.18 Kittiwake is a qualifying interest for several SPAs likely to be connected to the Turbine Area (within the mean-max + SD foraging range), with several non-SPA colonies also within range and so the species is considered to be of international conservation value. Refer to Table 14.17 for details of SPAs with connectivity to the Turbine Area with regards to kittiwake.

14.9.2.19 Kittiwake is deemed to be of high vulnerability, low recoverability, and international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.9.2.20 Overall, the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.9.2.21 No additional mitigation measures for kittiwake are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Great black-backed gull

Magnitude

14.9.2.22 The magnitude of impact is based on the criteria detailed in Table 14.7. When using the parameters recommended by NatureScot (2025b) the mean predicted number of great black-backed gull collision mortalities is 0 individuals in the breeding season and 1.48 individuals in the non-breeding season. There is no increase in baseline mortality in the breeding season, and an increase in the baseline mortality rate of 0.004 percentage points in the non-breeding season. On an annual basis, the mean number of mortalities is 1.48 individuals, which is an increase in baseline mortality rates of 0.004 percentage points (Table 14.23).

Table 14.24: Assessment of predicted collision mortality estimates for great black-backed gull on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Collision Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|--------------|---|--------------------|------------------------------------|--|
| Breeding | 1,645 | 0.095 | 0 (0–0) | 0 (0–0) |
| Non-breeding | 34,380 | | 1.48 (0.19–1.48) | 0.004 (<0.001–0.004) |
| Annual | 34,380 | | 1.48 (0.19–1.48) | 0.004 (<0.001–0.004) |

14.9.2.23 The impact is predicted to be of local spatial extent. The impact is expected to occur for the lifespan of the Offshore Project, and although it is reversible following decommissioning of the Offshore Project, it is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. Using both the range (as presented in Appendix 14.3, Volume 2c) and the rates recommended by NatureScot (2025b), the increase in mortality is well below 0.02 percentage points in each season and also on an annual basis. Therefore, the magnitude of impact is considered to be negligible.

Sensitivity of VOR

- 14.9.2.24 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.
- 14.9.2.25 Great black-backed gull was rated as one of the most vulnerable seabird species to collision impacts by Wade *et al.* (2016), due to the proportion of flights likely to occur at potential risk height and percentage of time in flight. In terms of nocturnal activity rate, great black-backed gull are considered to have a medium rate of activity at night with a score of 3 (out of 5) (Wade *et al.*, 2016). Therefore, great black-backed gull is considered to have very high vulnerability to collision (Table 14.10).
- 14.9.2.26 Great black-backed gull lay an average of 3 eggs and breed from the age of 4 onwards, typically living on average for 20 years (Burnell *et al.*, 2023). Populations of great black-backed gull have undergone decreases of approximately 63% in Scotland/*Alba* since the early 2000s (Burnell *et al.*, 2023). The overall national trend is one of decline, with an overall decline of 43% (Burnell *et al.*, 2023). Surveys managed by the RSPB in 2023 have recorded indicative declines of 20% across a number of sites in Britain in 2023 when compared against a pre-HPAI baseline (Tremlett *et al.*, 2024). Overall great black-backed gull is considered to have low recoverability (Table 14.9).
- 14.9.2.27 As great black-backed gull is a qualifying interest for 1 SPA likely to be connected to the Offshore Project (within the mean-max + SD foraging range), the species is considered to be of international conservation value. Refer to Table 14.17 for details of SPAs with connectivity to the Offshore Project with regards to great black-backed gull.
- 14.9.2.28 Great black-backed gull is deemed to be of very high vulnerability, low recoverability, and international value. The sensitivity of the receptor is therefore considered to be very high.

Significance of effect

- 14.9.2.29 Overall, the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptor is considered to be very high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

- 14.9.2.30 No additional mitigation measures for great black-backed gull are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Herring gull

Magnitude

- 14.9.2.31 The magnitude of impact is based on the criteria detailed in Table 14.7. When using the parameters recommended by NatureScot (2025b) the mean predicted number of herring gull

collision mortalities is 0 individuals in the breeding season and 1.65 individuals in the non-breeding season. There is no increase in baseline mortality in the breeding season, and an increase in the baseline mortality rate of 0.001 percentage points in the non-breeding season. On an annual basis, the mean number of mortalities is 1.65 individuals, which is an increase in baseline mortality rates of 0.001 percentage points (Table 14.23).

Table 14.25: Assessment of predicted collision mortality estimates for herring gull on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Collision Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|--------------|---|--------------------|------------------------------------|--|
| Breeding | 3,148 | 0.171 | 0 (0–0) | 0 (0–0) |
| Non-breeding | 173,299 | | 1.65 (1.16–1.65) | 0.001 (<0.001–0.001) |
| Annual | 173,299 | | 1.65 (1.16–1.65) | 0.001 (<0.001–0.001) |

14.9.2.32 The impact is predicted to be of local spatial extent. The impact is expected to occur for the lifespan of the Offshore Project, and although it is reversible following decommissioning of the Offshore Project, it is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. Using both the range (as presented in Appendix 14.3, Volume 2c) and the rates recommended by NatureScot (2025b), the increase in mortality is well below 0.02 percentage points in each season and also on an annual basis. Therefore, the magnitude of impact is considered to be negligible.

Sensitivity of VOR

14.9.2.33 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.

14.9.2.34 Herring gull was rated as one of the most vulnerable seabird species to collision impacts by Wade *et al.* (2016), due to the proportion of flights likely to occur at potential risk height and percentage of time in flight. In terms of nocturnal activity rate, herring gull are considered to have a medium rate of activity at night with a score of 3 (out of 5) (Wade *et al.*, 2016). Therefore, herring gull is considered to have very high vulnerability to collision (Table 14.10).

14.9.2.35 Herring gull lay up to 3 eggs and breed from the age of 5 onwards, typically living on average for 12 years (Burnell *et al.*, 2023). Natural nesting colonies of herring gull have undergone decreases of approximately 44% in Scotland/*Alba* since the early 2000s, whereas urban-nesting populations have increased considerably. It is unclear what the overall population trend is, as the urban-nesting population was not censused in Seabird 2000. Surveys managed by the RSPB in 2023 have recorded indicative declines of 7% across a number of sites in Britain in 2023 when compared against a pre-HPAI baseline (Tremlett *et al.*, 2024). Overall herring gull is considered to have low recoverability (Table 14.9).

14.9.2.36 Herring gull is not a qualifying interest of any SPAs likely to be connected to the Turbine Area (within the mean-max + SD foraging range) although there are multiple non-SPA colonies within range, so the species is considered to be of local value.

14.9.2.37 Herring gull is deemed to be of very high vulnerability, low recoverability, and local value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.9.2.38 Overall, the magnitude of the impact is considered negligible, and the sensitivity of the receptor is assessed as high. This results in an effect of a minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.9.2.39 No additional mitigation measures for herring gull are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Arctic tern

Magnitude

14.9.2.40 The magnitude of impact is based on the criteria detailed in Table 14.7. When using the parameters recommended by NatureScot (2025b) the mean predicted number of Arctic tern collision mortalities is 1.75 individuals in the breeding season and zero individuals in the post-breeding and pre-breeding seasons. In the breeding season, the baseline mortality rate is increased by 0.097 percentage points, and there is no increase in baseline mortality in the post-breeding or pre-breeding seasons. On an annual basis, the mean number of mortalities is 1.75 individuals, which is an increase in baseline mortality rates of 0.002 percentage points (Table 14.23).

Table 14.26: Assessment of predicted collision mortality estimates for Arctic tern on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Collision Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|---------------|--|--------------------|---------------------------------------|---|
| Breeding | 1,814 | 0.215 | 1.75 (1.75–1.77) | 0.097 (0.097–0.098) |
| Post-breeding | 71,398 | | 0 (0–0) | 0 (0–0) |
| Pre-breeding | 71,398 | | 0 (0–0) | 0 (0–0) |
| Annual | 71,398 | | 1.75 (1.75–1.77) | 0.002 (0.002–0.002) |

14.9.2.41 As the increase in baseline mortality exceeded 0.02 percentage points in the breeding season, PVA has been carried out for that scenario. Further information on the PVA is presented in Appendix 14.5, Volume 2c.

14.9.2.42 The PVA results (Table 14.27) indicate a median counterfactual of growth rate (CGR) of 0.9985 and a median counterfactual of population size (CPS) of 0.9459; i.e. the population growth rate would be 0.15% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 5.41% smaller than the counterfactual population size.

Table 14.27: Summary of PVA results for Arctic tern collision impacts after 35 years

| Season/ Population | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-----------------------|---------------------------------------|----------------------------|---------------|---------------|---------------------------------|-------------------------------------|
| Breeding | 1.754 | 0.8995 | 0.9985 | 0.9459 | 0.15 | 5.41 |

14.9.2.43 These results indicate that this level of impact would not adversely affect the population and would only result in a slight reduction in the growth rate currently seen in the population. Given the baseline mortality rate of 21.5% (Table 14.16), the additional impact from the Offshore Project, resulting in a 5.41% reduction in survival, is considered to be within the range of natural population fluctuations. Therefore, the change would likely be undetectable against background noise of natural variation. PVA simulations suggest that such a small shift does not significantly alter long-term population trends or increase extinction risk. As a result, the magnitude of impact is considered to be negligible.

Sensitivity of VOR

14.9.2.44 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.

14.9.2.45 Wade *et al.* (2016) assessed Arctic tern as being at moderate risk of collision with wind turbines due to the high proportion of time the species spends in flight. Arctic tern are considered to have a low rate of activity at night with a score of 1 (out of 5) (Wade *et al.*, 2016). Therefore, Arctic is considered to have medium vulnerability to collision (Table 14.10).

14.9.2.46 Arctic tern typically lay 1-2 eggs and breed from the age of 4 onwards. Although their average age is unknown, Arctic terns are long-lived and have been known to breed at 30-34 years of age (Burnell *et al.*, 2023). Arctic tern has undergone a decrease of approximately 54% in Scotland/*Alba* since the early 2000s. Surveys managed by the RSPB in 2023 have recorded indicative decreases of 1% across a number of sites in Britain in 2023 when compared against a pre-HPAI baseline (Tremlett *et al.*, 2024). Therefore, overall Arctic tern is considered to have low recoverability (Table 14.9).

14.9.2.47 The Study Area is not in the foraging range from any SPA at which Arctic terns are a qualifying feature. However, Arctic tern is listed on Annex 1 of the EU Birds Directive. The abundance of Arctic tern recorded in Offshore Project DAS qualifies as of regional importance. Overall, Arctic tern is considered to be of national conservation value.

14.9.2.48 Arctic tern is deemed to be of medium vulnerability, low recoverability, and national conservation value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.9.2.49 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.9.2.50 No additional mitigation measures for Arctic tern are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Fulmar

Magnitude

14.9.2.51 The magnitude of impact is based on the criteria detailed in Table 14.7. When using the parameters recommended by NatureScot (2025b) the mean predicted number of fulmar collision mortalities is 0.98 individuals in the breeding season, 0.11 individuals in the post-breeding, 0.08 individuals in the non-breeding season and 1.61 in the pre-breeding season. For all seasons, the baseline mortality rate is increased by less than 0.001 percentage points. On an annual basis, the mean number of mortalities is 2.78 individuals, which is an increase in baseline mortality rates of less than 0.001 percentage points (Table 14.23).

Table 14.28: Assessment of predicted collision mortality estimates for fulmar on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Collision Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|---------------|---|--------------------|------------------------------------|--|
| Breeding | 1,142,437 | 0.221 | 0.98 (0.98–1.00) | <0.001 (<0.001-<0.001) |
| Post-breeding | 828,194 | | 0.11 (0.11–0.11) | <0.001 (<0.001-<0.001) |
| Non-breeding | 556,367 | | 0.08 (0.08–0.08) | <0.001 (<0.001-<0.001) |
| Pre-breeding | 828,194 | | 1.61 (1.61–1.63) | <0.001 (<0.001-<0.001) |
| Annual | 1,142,437 | | 2.78 (2.78–2.82) | <0.001 (<0.001-<0.001) |

14.9.2.52 The impact is predicted to be of local spatial extent. The impact is expected to occur for the lifespan of the Offshore Project, and although it is reversible following decommissioning of the Offshore Project, it is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. Using both the range (as presented in Appendix 14.3, Volume 2c) and the rates recommended by NatureScot (2025b), the increase in mortality is well below 0.02 percentage points in each season and also on an annual basis. Therefore, the magnitude of impact is considered to be negligible.

Sensitivity of VOR

14.9.2.53 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.

14.9.2.54 Fulmar are considered to have very low vulnerability to collision with wind turbines (Wade *et al.*, 2016) and have been included on a precautionary basis due to a high uncertainty score and high nocturnal activity rate (4 out of 5) in Wade *et al.* (2016). Fulmar is considered to have very low vulnerability to collision (Table 14.10).

14.9.2.55 Fulmar has a low reproductive potential, due to laying a single egg per breeding attempt, and typical age of recruitment of 9 years. Fulmar populations have been declining in recent years (JNCC, 2020). Fulmar is therefore considered to have low recoverability (Table 14.9).

14.9.2.56 Fulmar is a qualifying interest for several SPAs likely to be connected to the Offshore Project (within the mean-max + SD foraging range). The species is therefore considered to be of national value. Refer to Table 14.17 for details of SPAs with connectivity to the Offshore Project with regards to fulmar.

14.9.2.57 Fulmar is deemed to be of very low vulnerability, low recoverability, and national value. The sensitivity of the receptor is therefore considered to be medium.

Significance of effect

14.9.2.58 Overall, the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of negligible to minor adverse significance. However, based on the receptor's very low vulnerability, a negligible adverse significance is considered the more appropriate conclusion. which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.9.2.59 No additional mitigation measures for fulmar are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Manx shearwater

- 14.9.2.60 Manx shearwater were assessed against the impact of collisions within Appendix 14.3, Volume 2c. The sCRM produced an estimate of zero collisions for Manx shearwater, in all seasons and on an annual basis, under every parameter combination considered. There is, therefore, considered to be no impact, and so collision risk to Manx shearwater is not considered further in this section.
- 14.9.2.61 It is noted that concerns have been raised about the validity of current sCRM for assessing collision risk to Manx shearwater, in particular with regards to the potential for lighting to affect behaviour (see multiple entries from consultees which mentioned Manx shearwater within Appendix 14.6, Volume 2c). A review of available literature pertinent to this risk is covered in Section 14.8.4. Based on that review, it is considered that there is insufficient evidence to support any form of quantitative modification to the sCRM process, and that overall the impact of the type of lighting installed on offshore wind turbines (i.e. red lights of relatively low brightness) is expected to be of negligible significance.

Gannet

Magnitude

- 14.9.2.62 The magnitude of impact is based on the criteria detailed in Table 14.7. When using the parameters recommended by NatureScot (2025b), with 70% macro avoidance incorporated into modelling during the pre-breeding and post-breeding season only, the mean predicted number of gannet collision mortalities is 0.2 individuals in the pre-breeding season, 21.9 individuals in the breeding season and 1.2 individuals in the post-breeding season. This is an increase in the baseline mortality rate of less than 0.001 percentage points in the pre-breeding season, 0.002 percentage points in the breeding season and less than 0.001 percentage points in the post-breeding season. On an annual basis, the mean number of mortalities is 23.3 individuals, which is an increase in baseline mortality rates of 0.003 percentage points (Table 14.23).

Table 14.29: Assessment of predicted collision mortality estimates for gannet on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Collision Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|---------------|---|--------------------|------------------------------------|--|
| Breeding | 922,238 | 0.193 | 21.9 (20.8–21.9) | 0.002 (0.002–0.002) |
| Post-breeding | 545,954 | | 1.2 (1.2–1.2) | <0.001 (<0.001–<0.001) |
| Pre-breeding | 661,888 | | 0.2 (0.2–0.2) | <0.001 (<0.001–<0.001) |
| Annual | 922,238 | | 23.3 (22.2–23.3) | 0.003 (0.003–0.003) |

14.9.2.63 The impact is predicted to be of local spatial extent. The impact is expected to occur for the lifespan of the Offshore Project, and although it is reversible following decommissioning of the Offshore Project, it is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. Using both the range (as presented in Appendix 14.3, Volume 2c) and the rates recommended by NatureScot (2025b), the increase in mortality is well below 0.02 percentage points in each season and also on an annual basis. Therefore, the magnitude of impact is considered to be negligible.

Sensitivity of VOR

14.9.2.64 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.

14.9.2.65 Although the latest scientific guidance showed gannet to display a high level of macro-avoidance (Peschko *et al.*, 2020), gannet is rated as relatively vulnerable to collision impacts by Wade *et al.* (2016). In terms of nocturnal activity rate, gannet is considered to have a medium rate of activity at night with a score of 2 (out of 5) (Wade *et al.*, 2016). Therefore, gannet is considered to have high vulnerability to collision (Table 14.10).

14.9.2.66 Gannet is a qualifying interest for several SPAs likely to be connected to the Turbine Area (within the mean-max + SD foraging range). The species is therefore considered to be of international value. Refer to Table 14.17 for details of SPAs with connectivity to the Turbine Area with regards to gannet.

14.9.2.67 Gannet have low reproductive potential given a typical age of first breeding of 5 years and typically laying only a single egg per breeding season. However, although gannet has a low reproductive potential, the species has demonstrated a consistent increasing trend in abundance since the 1990s (JNCC, 2020). It is of note that the species has suffered from the outbreak of avian flu during the 2022 breeding season (Pearce-Higgins *et al.*, 2023), with declines of 25% recorded at certain sites in Britain in 2023 when compared against a pre-HPAI baseline (Tremlett *et al.*, 2024). Therefore, whilst the overall population has shown steady growth, HPAI has led to some short-term declines. Therefore, overall gannet is deemed to have medium recoverability (Table 14.9).

14.9.2.68 Gannet is deemed to be of high vulnerability, medium recoverability, and international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.9.2.69 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.9.2.70 No additional mitigation measures for gannet are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Migratory birds

Magnitude

- 14.9.2.71 The magnitude of impact is based on the criteria detailed in Table 14.7. It is recognised that migratory birds may not be adequately characterised by the site-specific DAS carried out for the Offshore Project. Migratory birds may fly at night (when no DAS are carried out) or in pulse movements which could easily be missed by DAS, as the DAS were conducted on a monthly basis. Therefore, the risk to migratory birds cannot be assessed using the same methodology as has been applied for regularly occurring seabirds (above). Instead, the potential effect on migratory birds has been assessed using alternative approaches, drawing on available resources. For migratory waterbirds, the assessment relied on the mCRM tool developed for Marine Scotland Science (HiDef, 2022), with supplementary information from Woodward *et al.* (2003). For migratory seabirds, a “broad front” approach was followed, based on WWT Consulting and MacArthur Green (2014), with collision estimates then calculated using Band (2012). Full details are provided in Appendix 14.4, Volume 2c.
- 14.9.2.72 Of the 69 species of migratory waterbird considered, the majority had zero or negligible collision estimates. When using the recommended avoidance rates (from Woodward *et al.*, 2023), only 1 species, wigeon, had an expected annual collision total exceeding 1 bird per year. For all species, the increase in baseline mortality was well below a 0.02 percentage point change, of the relevant population using UK waters. Full details are provided in Appendix 14.4, Volume 2c.
- 14.9.2.73 Of the 11 species of migratory seabird considered, all had negligible collision estimates. When using the recommended avoidance rates and model Option 2, no species had an expected annual collision total exceeding 1 bird per year. Arctic tern was included in both the sCRM and mCRM assessments due to its long-distance migratory behaviour. Given the species’ wide-ranging movements, it is possible that DAS data may not have fully captured its abundance during migration periods. As a precaution, a separate migratory assessment was undertaken to ensure potential impacts during passage were appropriately considered. For all species (including Arctic tern), the increase in baseline mortality was well below a 0.02 percentage point change of the relevant BDMPS/passage population. Full details are provided in Appendix 14.4, Volume 2c.
- 14.9.2.74 The impact is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. Under this approach, due

to the increase in baseline mortality falling well below a 0.02 percentage point for all species, the magnitude for all species is therefore considered to be negligible.

Sensitivity of receptors

- 14.9.2.75 The sensitivity described for each migratory seabird is based on the criteria provided in Table 14.12.
- 14.9.2.76 The sensitivity of migratory birds varies between species, with some species having higher sensitivity levels than others.
- 14.9.2.77 Although migratory waterbirds have not been significantly studied in the offshore environment, vulnerability to collisions is likely to be generally low, since most migration occurs on a broad front and typically above rotor height. However, during periods of poor weather, this risk may increase as birds may fly lower. Migratory seabirds, on the other hand, typically fly low to the sea surface and are therefore largely below rotor blade height. This pattern is supported by recent research showing that while many waterbirds migrate at altitudes within the rotor-swept zone, broad-front migration and variable flight heights reduce the likelihood of concentrated collision risk (Kamata *et al.* 2022).
- 14.9.2.78 Recoverability of populations of migrants may vary considerably, with smaller wader species with a relatively favourable conservation status (e.g. dunlin) faring better than larger species with lower reproductive rates (e.g. Eurasian curlew).
- 14.9.2.79 Migratory birds are deemed to be of low to medium vulnerability, low to high recoverability and local to international value. On a precautionary basis and purposes of this assessment these species are assumed to have high sensitivity to collision (i.e. medium vulnerability, low recoverability, and international value).

Significance of effect

- 14.9.2.80 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

- 14.9.2.81 No additional mitigation measures for migratory birds are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

14.9.3 DISTRIBUTIONAL RESPONSES (DISPLACEMENT) ASSOCIATED WITH THE OFFSHORE PROJECT

- 14.9.3.1 Disturbance as the result of the presence of wind turbines, the OSP (if required) and operational activities during the O&M phase of an OWF has the potential to displace Marine and Nearshore

Ornithology receptors from the Offshore Project Boundary. In relation to OWF development, displacement is defined as a reduction in the number of seabirds occurring within or immediately adjacent to an OWF (Furness *et al.*, 2013).

- 14.9.3.2 Displacement can be considered indirect habitat loss, as the result is that birds are unable to utilise the habitat in the area from which they have been displaced. The loss of habitat means birds may move to areas already occupied by other birds and thus face higher intra- or inter-specific competition due to a higher density of individuals competing for the same resource. Alternatively, displaced birds may be forced to move into areas of lower quality (e.g. areas of lower prey availability) or travel longer distances to reach habitat of a suitable quality. This could therefore affect their demographic fitness (i.e. survival rates and breeding productivity), as well as potentially impacting on other birds in areas that displaced birds move to (for example, by increasing competition for resources).
- 14.9.3.3 Table 14.18 gives the scenario that would lead to the greatest amount of disturbance and displacement during the O&M phase. This results from the largest Turbine Area and the greatest amount of vessel and helicopter activity to and from the OWF and within the OCAS.
- 14.9.3.4 The displacement assessment is based on the use of the matrix approach (JNCC *et al.*, 2022a), which was agreed as suitable in the post-Scoping consultation (see Appendix 14.6, Volume 2c). As sensitivity to displacement differs considerably between seabird species, species were screened and progressed for the matrix approach using 'Disturbance Sensitivity' and 'Habitat Specialisation' scores from Bradbury *et al.* (2014) and Wade *et al.* (2016) as recommended by the SNCB Interim Displacement Advice Note (JNCC *et al.*, 2022a). In addition to the species' sensitivity rating, the importance of a species abundance as recorded during baseline surveys of the Offshore Project was considered as to whether species were progressed to the matrix stage (see Appendix 14.2, Volume 2c). The species progressed to the matrix stage were kittiwake, guillemot, razorbill, puffin, red-throated diver, great northern diver, and gannet, and these species are considered in detail in this section. All other species were excluded on the basis there was no potential for a significant effect (Appendix 14.2, Volume 2c).
- 14.9.3.5 For each of the species considered (kittiwake, guillemot, razorbill, puffin, red-throated diver, great northern diver, and gannet, as identified in Appendix 14.2, Volume 2c), displacement impacts were quantified for the population within the Turbine Area plus appropriate buffer. SNCBs recommend for most species a standard displacement buffer of 2 km with the exception of the diver species as they can be affected at distances over 4 km (Natural England, 2022; JNCC *et al.*, 2022 a, b). Therefore, the population within the Turbine Area plus 2 km buffer has been applied for kittiwake, guillemot, razorbill, puffin, and gannet, whilst the population within the Turbine Area plus 4 km buffer has been applied for red-throated diver and great northern diver. The vast majority of the OCAS is within 4 km of the Turbine Area which means that O&M activities within the OCAS are

considered as part of the matrix assessment for the most vulnerable species to vessels (the 2 diver species).

- 14.9.3.6 Full displacement matrices showing the estimated mortality resulting from 0% to 100% displacement and 0% to 100% mortality of displaced individuals are provided in Appendix 14.2, Volume 2c. Within the displacement matrices, the rates advocated for by NatureScot (2023f) have been utilised and presented alongside an Applicant Approach. These rates are discussed within Appendix 14.2, Volume 2c and within each species' section below.
- 14.9.3.7 Where available, abundance estimates based on Marine Renewables Strategic Environmental Assessment (MRSea) modelling have been used, with design-based abundance estimates used otherwise (see Appendix 14.2, Volume 2c for details on approaches to abundance estimation). Displacement matrices based solely on design-based abundance estimates are also presented in Appendix 14.2, Volume 2c.

Evidence used to inform displacement and mortality rates used in the Applicant Approach

- 14.9.3.8 There is limited empirical evidence on which mortality rate to use when assessing the impacts of displacement of OWFs. However, the current NatureScot guidance, based on expert opinion, is to consider a mortality rate of up to 10% for divers, 5% for auks and up to 3% for kittiwake and gannet (NatureScot, 2023f). Van Kooten *et al.* (2019) studied the effects of displacement of seabirds using energy-budget models for 2 scenarios using habitat utilisation maps and a fixed 10% mortality rate. The evidence from this study suggests that a 1% mortality rate for displaced birds is more appropriate than the potentially over-precautionary 5% mortality rate.
- 14.9.3.9 APEM (2022a, b) also considered mortality rates, though fewer studies have attempted to quantify displacement-consequent mortality given the practical and theoretical limitations in doing so. The review concluded that the available evidence is "incompatible" with a 10% mortality rate and the most likely mortality rate is considered to be "negligible or undetectable". APEM (2022a, b) suggest that a mortality rate of 1% or less would be more consistent with the available evidence and still precautionary. Therefore, the Applicant Approach applies a 1% mortality rate, based on this evidence. The mortality rate of 1% follows previous advice from the Marine Scotland on Forth and Tay projects (Marine Scotland, 2017). Additional evidence on displacement from offshore wind farms for auks (puffin, guillemot and razorbill), gannet, kittiwake and divers used to inform the Applicant Approach is presented within the following paragraphs.

Puffin, guillemot, and razorbill

- 14.9.3.10 Evidence shows that auk species exhibit a medium level of sensitivity to vessel and helicopter traffic (Garthe and Hüppop, 2004; Furness and Wade, 2012; Bradbury *et al.*, 2014). Furthermore, displacement impacts from post-consent monitoring studies (from 13 different European offshore wind farm sites) have been collated and reviewed by Dierschke *et al.*, 2016), which found auk

species to show 'weak displacement' overall, but results were highly variable. Similarly, a recent review submitted by Hornsea Four OWF (APEM, 2022a) summarises all current post consent-monitoring studies undertaken to date within the North Sea and UK Western Waters and provides an extensive study and analysis of the empirical data from OWFs. This review found that auk displacement varies considerably across different sites, with displacement rates ranging from +112% to -75%, with the most common finding being no significant effect.

- 14.9.3.11 Of projects that have quantified displacement post-construction, the closest to the Offshore Project is Beatrice OWF (approximately 200 km from the Offshore Project), which has found low levels of guillemot displacement (MacArthur Green, 2023) with results suggesting that the area of decreased abundance which overlaps the wind farm is no more than partially related to the wind farm (and only in the pre-post-1 comparison), and is either linked to other changes in the area such as moving prey hotspots, or may simply be due to chance.
- 14.9.3.12 Furthermore, evidence suggests that although auk species are somewhat sensitive to displacement, the effects are short-term, and studies indicate auk habituation to offshore wind farms. For example, a study at Thanet Offshore Wind Farm found auk species became habituated, and the displacement rate of between 75% and 85% in the first year of operations fell to between 31% and 41% within years 2 and 3 of operations (Royal Haskoning, 2013). Further evidence is emerging through additional post-construction monitoring of offshore wind farms; for instance, there are reports of auk numbers increasing and observations of foraging behaviour within the OWF itself (Leopold and Verdaat, 2018). This suggests the displacement rates of auk species within the Offshore Project will reduce over time.
- 14.9.3.13 Based on the review of the relevant literature, a displacement rate of 50% during the operations and maintenance phase of the Offshore Project has been deemed appropriate for the Applicant Approach for the auk species (i.e. guillemot, razorbill, and puffin) considered in this assessment. This rate is considered to be highly precautionary as a study of OWFs in the German North Sea found reduced displacement rates (~20%) of guillemot during the breeding season compared to the non-breeding season (Peschko *et al.*, 2020). This is of important consideration, as the mean displacement rates derived from the Dierschke *et al.* (2016) review was primarily from data collected in the non-breeding season. Therefore, by applying a single displacement rate of 50% across all bio-seasons within the Offshore Project, this ensures a precautionary rate is used for the assessment. Additionally, the recent studies by MacArthur Green (2019 and 2023) highlighted that a displacement rate of 50% was also suitable for puffin and is therefore the displacement rate utilised within the Applicant Approach for all auk species.

Gannet

- 14.9.3.14 Evidence suggests that gannet show a low level of sensitivity to ship and helicopter traffic (Garthe and Hüppop, 2004; Furness and Wade, 2012). However, their avoidance rates to OWFs can be high.

Natural England recently reviewed 9 studies that reported on northern gannet avoidance rates using a variation of survey methods (Pavat *et al.*, 2023). The avoidance rates reported range from 61.7%-100%. Another review by APEM (2022b) looked at studies across 25 OWFs, over different seasons, and reported displacement rates of 40%-60% during the breeding season, and 60%-80% during the non-breeding season. In light of literature, and following guidance from NatureScot (2023f), using a displacement rate of 70% has been deemed appropriate for the Applicant Approach.

Kittiwake

- 14.9.3.15 Kittiwake are considered to have a low habitat specialisation score and low sensitivity to displacement (Bradbury *et al.*, 2014; Furness and Wade, 2012; Nature Scot, 2023h).
- 14.9.3.16 Studies regarding the displacement at Egmond aan Zee OWF (Leopold *et al.*, 2011), Bligh Bank OWF and Thorntonbank OWF (Vanermen, 2013). Horns Rev OWF, Princess Amalia Windpark (Furness, 2013) reported no significant displacement of kittiwake.
- 14.9.3.17 Nature Scot advise a 30% displacement for kittiwake in both the breeding and non-breeding season (Nature Scot, 2023h). In light of this guidance and additional evidence stated, for the purpose of this assessment, precautionary rates of 30% for displacement have been used for the operations and maintenance phase of the Offshore Project as part of the Applicant Approach.

Divers

- 14.9.3.18 No separate Applicant Approach has been considered for red-throated diver. In line with guidance (JNCC *et al.*, 2022b), a displacement rate of 100% has been applied. Neither NatureScot (2023f) nor the SNCB guidance provides a recommended mortality rate. A mortality rate of 10% has been applied, in line with previous advice on the Awel y Môr OWF Array (RWE Renewables UK, 2022).
- 14.9.3.19 Evidence regarding the sensitivity of great northern diver is sparse and at times contradictory. Some evidence (e.g. Bradbury *et al.*, 2014) indicates that great northern diver have high vulnerability to disturbance and displacement, while other research in Ireland has shown that great northern diver do not show a flush response to boat traffic, even when boats are within 20 m of some birds (Gittings *et al.*, 2015). As a precautionary approach, it is assumed that great northern diver sensitivity is high. To reflect this, the Applicant Approach proposes a displacement rate of 100%, in accordance with the rate used in the North Irish Sea OWF Array (North Irish Sea Array Wind Farm Limited, 2024).
- 14.9.3.20 For mortality, the SNCB rate is taken to be the same as for red-throated diver (10%) given the identical displacement rates (100%). For the Applicant Approach, a mortality range of 1–5% is used, on the premise that great northern diver are less susceptible to mortality from displacement than red-throated diver. Furness & Wade (2012) presents a habitat flexibility vulnerability score of 4 for red-throated diver and 3 for great northern diver, reflecting the greater habitat flexibility of great

northern diver. This means that great northern diver are able to respond better to displacement e.g. find suitable feeding grounds elsewhere. This reduces their likelihood of mortality.

14.9.3.21 The next sections present the results of the distributional response assessment for each of the species scoped in for assessment (Table 14.3). Full details of the impact are presented in Appendix 14.2, Volume 2c.

Kittiwake

Magnitude

14.9.3.22 The magnitude of impact is based on the criteria detailed in Table 14.7. For kittiwake in all 3 seasons (breeding, post breeding, and pre-breeding) and on an annual basis, the estimated percentage point increase in baseline mortality remains below the 0.02 percentage point increase threshold as defined by NatureScot (Table 14.30). This conclusion is applicable when modelling using the parameters advocated for by both NatureScot and the Applicant, both of which are included in Table 14.30.

Table 14.30: Assessment of predicted displacement mortality estimates for kittiwake on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Displacement Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|--|---|--------------------|---------------------------------------|--|
| NatureScot (30% displacement; 1-3% mortality) | | | | |
| Breeding | 221,825 | 0.156 | 0-0 | 0.000-0.000 |
| Post-breeding | 911,586 | | 1-2 | <0.001-<0.001 |
| Pre-breeding | 691,526 | | 2-6 | <0.001-<0.001 |
| Annual | 911,586 | | 3-8 | <0.001-<0.001 |
| Applicant (30% displacement; 1% mortality) | | | | |
| Breeding | 221,825 | 0.156 | 0 | 0.000 |
| Post-breeding | 911,586 | | 1 | <0.001 |
| Pre-breeding | 691,526 | | 2 | <0.001 |
| Annual | 911,586 | | 3 | <0.001 |

14.9.3.23 The total displacement impact is predicted to result in no change during the breeding season and very slight change during the post- and pre-breeding seasons to the baseline mortality of the biogeographic population of kittiwake when considering both NatureScot and the Applicant Approach. The impact is predicted to be continuous, of local spatial extent, of long-term duration, and of high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be negligible.

Sensitivity of VOR

- 14.9.3.24 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.
- 14.9.3.25 In terms of behavioural response to OWF structures, kittiwake is considered to have a low vulnerability to displacement, with a score of 2 (out of 5) assigned by Wade *et al.* (2016) (Table 14.10).
- 14.9.3.26 Kittiwake lay 2 eggs and breed from the age of 4 onwards, typically living on average for 12 years (Burnell *et al.*, 2023). Kittiwake have undergone decreases of approximately 57% in Scotland/*Alba* since the early 2000s. Surveys managed by the RSPB in 2023 have recorded indicative increases of 8% across a number of sites in Britain in 2023 when compared against a pre-HPAI baseline (Tremlett *et al.*, 2024). Overall, kittiwake is deemed to have low recoverability (Table 14.9).
- 14.9.3.27 Kittiwake is a qualifying interest for several SPAs likely to be connected to the Offshore Project (within the mean-max + SD foraging range), with several non-SPA colonies also within range and so the species is considered to be of international conservation value. Refer to Table 14.17 with connectivity to the Offshore Project.
- 14.9.3.28 Kittiwake is deemed to be of low vulnerability, low recoverability, and international value. The sensitivity of the receptor is therefore considered to be medium.

Significance of effect

- 14.9.3.29 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of negligible to minor adverse significance. However, based on the receptors low vulnerability to displacement, the effect is considered to be of negligible adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

- 14.9.3.30 No additional mitigation measures for kittiwake are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Guillemot

Magnitude

- 14.9.3.31 For guillemot in both seasons (breeding and non-breeding), the estimated percentage point increase in baseline mortality remains below the 0.02 percentage point increase threshold as defined by NatureScot (Table 14.23). This conclusion is applicable when modelling using the parameters advocated for by both NatureScot and the Applicant, both of which are included in Table 14.31.

14.9.3.32 On an annual basis, the estimated percentage point increase in baseline mortality remains below the 0.02 percentage point increase threshold when considering the Applicant Approach (50% displacement and 1% mortality year-round) and the lower scenario of the NatureScot Approach (60% displacement and 1% mortality in the non-breeding season and 60% displacement and 3% mortality in the breeding season). However, under the upper scenario of the NatureScot Approach (60% displacement and 3% mortality in the non-breeding season and 60% displacement and 5% mortality in the breeding season), the increase in baseline mortality exceeds 0.02 percentage points, triggering a PVA. Further details on the PVA are provided in Appendix 14.5, Volume 2c, Section 3.2.

Table 14.31: Assessment of predicted displacement mortality estimates for guillemot on seasonal and annual bases against the baseline mortality of relevant regional populations.

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Displacement Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|---|---|--------------------|---------------------------------------|--|
| NatureScot (60% displacement; 3-5% mortality in breeding season and 1-3% mortality in non-breeding season) | | | | |
| Breeding | 278,589 | 0.133 | 9–15 | 0.003–0.005 |
| Non-breeding | 278,589 | | 16–48 | 0.006–0.017 |
| Annual | 278,589 | | 25–63 | 0.009–0.023 |
| Applicant (50% displacement; 1% mortality) | | | | |
| Breeding | 278,589 | 0.133 | 2 | <0.001 |
| Non-breeding | 278,589 | | 13 | 0.005 |
| Annual | 278,589 | | 15 | 0.005 |

14.9.3.33 The PVA results (Table 14.32) indicate a median CGR of 0.9997 and a median CPS of 0.9910; i.e. the population growth rate would be 0.03% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 0.90% smaller than the counterfactual population size.

Table 14.32: Summary of PVA results for guillemot displacement impacts after 35 years

| Season/Population | Scenario | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-------------------|------------------|------------------------------------|-------------------------|------------|------------|------------------------------|----------------------------------|
| Annual | NatureScot Upper | 63 | 1.0249 | 0.9997 | 0.9910 | 0.03 | 0.90 |

14.9.3.34 These results indicates that the impact predicted from the upper scenario of NatureScot's Approach would not adversely affect the population. While this scenario assumes highly precautionary rates (see paragraphs 14.9.3.10 to 14.9.3.13), the predicted effect would only result in a slight reduction in the growth rate, which would be undetectable against natural population fluctuations. Therefore, the magnitude of impact is considered to be negligible.

Sensitivity of VOR

14.9.3.35 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.

14.9.3.36 In terms of behavioural response to wind farm structures, guillemot is considered to have a high vulnerability to displacement, being assigned a score of 4 (out of 5) by Wade *et al.* (2016) (Table 14.10).

14.9.3.37 Guillemot is deemed to have medium recoverability (Table 14.9).

14.9.3.38 The Offshore Project is within the foraging range of guillemot from several SPAs at which the species is a qualifying feature (see Table 14.17). Based on the regional importance of the population recorded during baseline surveys of the Survey Area, guillemot is considered to be of international value.

14.9.3.39 Guillemot is deemed to be of high vulnerability, medium recoverability, and international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.9.3.40 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.9.3.41 No additional mitigation measures for guillemot are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Razorbill

Magnitude

14.9.3.42 The magnitude of impact is based on the criteria detailed in Table 14.7. For razorbill in the post-breeding, non-breeding, and pre-breeding seasons, and on an annual basis, the estimated percentage point increase in baseline mortality remains below the 0.02 percentage point increase threshold as defined by NatureScot (Table 14.33). This conclusion is applicable when modelling using the parameters advocated for by both NatureScot and the Applicant both of which are included in Table 14.33.

14.9.3.43 In the breeding season, the estimated percentage point increase in baseline mortality remains below the 0.02 percentage point increase threshold when considering the Applicant Approach (50% displacement and 1% mortality year-round) and the lower scenario of the NatureScot Approach (60% displacement and 1% mortality in the non-breeding season and 60% displacement and 3% mortality in the breeding season). However, under the upper scenario of the NatureScot Approach (60% displacement and 3% mortality in the non-breeding season and 60% displacement and 5% mortality in the breeding season), the increase in baseline mortality marginally exceeds 0.02 percentage points, triggering a PVA. Further details on the PVA are provided in Appendix 14.5, Volume 2c, Section 3.2.

Table 14.33: Assessment of predicted displacement mortality estimates for razorbill on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Displacement Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|---|---|--------------------|---------------------------------------|--|
| NatureScot (60% displacement; 3-5% mortality in breeding season and 1-3% mortality in pre-breeding, post-breeding, and non-breeding seasons) | | | | |
| Breeding | 55,523 | 0.188 | 7-12 | 0.013-0.022 |
| Post-breeding | 606,914 | | 3-8 | <0.001-0.001 |
| Non-breeding | 341,422 | | 0-0 | 0.000-0.000 |
| Pre-breeding | 606,914 | | 4-12 | <0.001-0.002 |
| Annual | 606,914 | | 14-32 | 0.002-0.005 |
| Applicant (50% displacement; 1% mortality) | | | | |
| Breeding | 55,523 | 0.188 | 2 | 0.004 |
| Post-breeding | 606,914 | | 2 | <0.001 |
| Non-breeding | 341,422 | | 0 | 0.000 |
| Pre-breeding | 606,914 | | 3 | <0.001 |
| Annual | 606,914 | | 7 | 0.001 |

14.9.3.44 The PVA results (Table 14.34) indicate a median CGR of 0.9998 and a median CPS of 0.9911; i.e. the population growth rate would be 0.02% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 0.89% smaller than the counterfactual population size.

Table 14.34: Summary of PVA results for razorbill displacement impacts after 35 years

| Season/ Population | Scenario | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-----------------------|----------|------------------------------------|-------------------------|------------|------------|------------------------------|----------------------------------|
| | | | | | | | |

| | | | | | | | |
|----------|---------------------|----|--------|--------|--------|------|------|
| Breeding | NatureScot Upper | 12 | 0.9768 | 0.9998 | 0.9911 | 0.02 | 0.89 |
|----------|---------------------|----|--------|--------|--------|------|------|

14.9.3.45 These results indicates that the impact predicted from the upper scenario of NatureScot's Approach would not adversely affect the population and would only result in a slight reduction in the growth rate currently seen in the population and would therefore be undetectable against natural population fluctuations. Therefore, the magnitude of impact is considered to be negligible.

Sensitivity of VOR

14.9.3.46 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.

14.9.3.47 In terms of behavioural response to wind farm structures, razorbill is considered to have a high vulnerability to displacement, being assigned a score of 4 (out of 5) by Wade *et al.* (2016) (Table 14.10).

14.9.3.48 Although the species has a low reproductive potential (Robinson, 2005), razorbill are deemed to have a high recoverability given their increasing trend in abundance in the UK (JNCC, 2020) (Table 14.9).

14.9.3.49 Razorbill is a qualifying interest for several SPAs likely to be connected to the Offshore Project (within the mean-max + SD foraging range) and with several non-SPA colonies also within range and so the species is considered to be of international value. Refer to Table 14.17 for details of SPAs with connectivity to the Offshore Project with regards to razorbill.

14.9.3.50 Razorbill is deemed to be of high vulnerability, high recoverability, and international value. The sensitivity of the receptor is therefore considered to be medium.

Significance of effect

14.9.3.51 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of negligible to minor adverse significance. However, based on the receptor's overall recoverability, a negligible adverse significance is considered the more appropriate conclusion which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.9.3.52 No additional mitigation measures for razorbill are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Puffin

Magnitude

14.9.3.53 The magnitude of impact is based on the criteria detailed in Table 14.7. For puffin in both seasons (breeding and non-breeding) and on an annual basis, the estimated percentage point increase in baseline mortality remains below the 0.02% point increase threshold as defined by NatureScot (Table 14.35). This conclusion is applicable when modelling using the parameters advocated for by both NatureScot and the Applicant, both of which are included in Table 14.35.

Table 14.35: Assessment of predicted displacement mortality estimates for puffin on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Displacement Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|--|---|--------------------|---------------------------------------|--|
| NatureScot (60% displacement; 3-5% mortality) | | | | |
| Breeding | 1,194,457 | 0.176 | 70–117 | 0.006–0.010 |
| Non-breeding | 304,557 | | 2–7 | <0.001–0.002 |
| Annual | 1,194,457 | | 72–124 | 0.006–0.010 |
| Applicant (50% displacement; 1% mortality) | | | | |
| Breeding | 1,194,457 | 0.176 | 20 | 0.002 |
| Non-breeding | 304,557 | | 2 | <0.001 |
| Annual | 1,194,457 | | 22 | 0.002 |

14.9.3.54 The total displacement impact is predicted to result in a very slight change to the baseline mortality of the biogeographic population of puffin for both NatureScot's and the Applicant Approach. The impact is predicted to be of local spatial extent, long-term duration, continuous, and of high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be negligible.

Sensitivity of VOR

14.9.3.55 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.

14.9.3.56 In terms of behavioural response to wind farm structures, puffin is considered to have a medium vulnerability to displacement, being assigned a score of 3 (out of 5) by Wade *et al.* (2016) (Table 14.10).

14.9.3.57 Puffin is deemed to have medium recoverability (Table 14.9). Puffin is a qualifying interest for several SPAs likely to be connected to the Offshore Project (within the mean-max + SD foraging range) and with several non-SPA colonies also within range and so the species is considered to be

of international value. Refer to Table 14.17 for details of SPAs with connectivity to the Offshore Project with regards to puffin.

14.9.3.58 Puffin is deemed to be of medium vulnerability, medium recoverability, and international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.9.3.59 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.9.3.60 No additional mitigation measures for puffin are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Red-throated diver

Magnitude

14.9.3.61 For red-throated diver in the pre-breeding, post-breeding and non-breeding seasons the estimated percentage point increase in baseline mortality is 0, which remains below the 0.02% point increase threshold as defined by NatureScot (Table 14.36). However, the breeding and annual estimated percentage point increase in baseline mortality is above NatureScot's threshold of 0.02 percentage point change, triggering a PVA. Further details on the PVA are provided in Appendix 14.5, Volume 2c, Section 3.2. This conclusion is applicable when modelling using the parameters advocated for by both NatureScot and the Applicant, both of which are included in Table 14.36.

Table 14.36: Assessment of predicted displacement mortality estimates for red-throated diver on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Displacement Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|--|---|--------------------|---------------------------------------|--|
| NatureScot (100% displacement; 10% mortality) | | | | |
| Breeding | 278 | 0.250 | 0.4 | 0.144 |
| Post-breeding | 4,373 | | 0.4 | 0.009 |
| Non-breeding | 861 | | 0.0 | 0.000 |
| Pre-breeding | 4,373 | | 0.4 | 0.009 |
| Annual | 4,373 | | 1.2 | 0.027 |
| Applicant (100% displacement; 10% mortality) | | | | |
| Breeding | 278 | 0.250 | 0.4 | 0.144 |

| | | | | |
|---------------|-------|--|-----|-------|
| Post-breeding | 4,373 | | 0.4 | 0.009 |
| Non-breeding | 861 | | 0.0 | 0.000 |
| Pre-breeding | 4,373 | | 0.0 | 0.009 |
| Annual | 4,373 | | 1 | 0.027 |

14.9.3.62 During the breeding season the PVA results (Table 14.37) indicate a median CGR of 0.9979 and a median CPS of 0.9341; i.e. the population growth rate would be 0.21% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 6.59% smaller than the counterfactual population size.

14.9.3.63 Annually the PVA results (Table 14.37) indicate a median CGR of 0.9996 and a median CPS of 0.9852; i.e. the population growth rate would be 0.04% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 1.48% smaller than the counterfactual population size.

Table 14.37: Summary of PVA results for red-throated diver displacement impacts after 35 years

| Season/ Population | Scenario | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-----------------------|-----------------------------|--|----------------------------|---------------|---------------|------------------------------------|--|
| Breeding | NatureScot and Applicant | 0.4 | 0.9713 | 0.9979 | 0.9341 | 0.21 | 6.59 |
| Annual | NatureScot and Applicant | 1.2 | 0.9740 | 0.9996 | 0.9852 | 0.04 | 1.48 |

14.9.3.64 These results indicate that this level of impact would not adversely affect the population and would only result in a slight reduction in the growth rate currently seen in the population. Given the background mortality rate of 25% (see Table 14.16), the additional impact from the Offshore Project is considered to be within the range of natural population fluctuations. Red-throated diver, like many long-lived seabirds, experience year-to-year variability in survival and productivity due to environmental factors. PVA simulations suggest that such a small change in survival would not significantly alter long-term population trends or increase extinction risk. As such, the effect would be undetectable against natural variation, and the magnitude of impact is considered to be negligible.

Sensitivity of VOR

14.9.3.65 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.

14.9.3.66 In terms of behavioural response to wind farm structures, red-throated diver is considered to have a very high vulnerability to displacement, being assigned a score of 5 (out of 5) by Wade *et al.* (2016). Red-throated diver also have relatively low habitat flexibility, being assigned a score of 4

(out of 5; where 5 indicates the lowest habitat flexibility), which makes them more vulnerable to negative impacts as a result of being displaced. Overall, red-throated diver is considered to have a very high vulnerability to displacement (Table 14.10).

14.9.3.67 Red-throated diver are relatively long-lived, with an average life expectancy of 9 years (BTO, 2025). They typically start breeding at 3 years old, and lay 1-3 eggs. There are relatively sparse data on red-throated diver, but the latest population estimate indicates the UK breeding population increased between 1994 and 2006 (Dillon *et al.*, 2009). Recoverability is therefore considered medium (Table 14.9).

14.9.3.68 The Offshore Project has potential connectivity to 1 SPA for which red-throated diver are a designated feature, Lewis Peatlands SPA. Red-throated diver is therefore considered to be of international conservation value.

14.9.3.69 Red-throated diver is deemed to be of very high vulnerability, medium recoverability, and international value. The sensitivity of the receptor is therefore considered to be very high.

Significance of effect

14.9.3.70 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be very high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.9.3.71 No additional mitigation measures for red-throated diver are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Great northern diver

Magnitude of the impact

14.9.3.72 The magnitude of impact is based on the criteria detailed in Table 14.7. For great northern diver in the non-breeding season and on an annual basis, the estimated percentage point increase in baseline mortality exceeds the 0.02% point increase threshold as defined by NatureScot (Table 14.38), triggering a PVA. Further details on the PVA are provided in Appendix 14.5, Volume 2c, Section 3.2. This conclusion is applicable when modelling using the parameters advocated for by both NatureScot and the Applicant, both of which are included in Table 14.38.

14.9.3.73 Note that great northern diver do not breed in the UK and are only present in UK waters in the non-breeding season; the impacts, regional reference population and PVA results are therefore the same in the non-breeding season and on an annual basis.

Table 14.38: Assessment of predicted displacement mortality estimates for great northern diver on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Displacement Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|--|---|--------------------|---------------------------------------|--|
| NatureScot (100% displacement; 10% mortality) | | | | |
| Non-breeding | 2,000 | 0.163 | 3 | 0.150 |
| Annual | 2,000 | | 3 | 0.150 |
| Applicant (100% displacement; 1-5% mortality) | | | | |
| Non-breeding | 2,000 | 0.163 | 0-1 | 0.000-0.050 |
| Annual | 2,000 | | 0-1 | 0.000-0.050 |

14.9.3.74 The PVA results (Table 14.39) indicate a median CGR of 0.9981-0.9994 and a median CPS of 0.9368-0.9787; i.e. the population growth rate would be 0.06%-0.19% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 2.13%-6.32% smaller than the counterfactual population size.

Table 14.39: Summary of PVA results for great northern diver displacement impacts after 35 years

| Season/ Population | Scenario | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-------------------------|------------|------------------------------------|-------------------------|------------|------------|------------------------------|----------------------------------|
| Non-breeding and Annual | NatureScot | 3 | 0.9647 | 0.9981 | 0.9368 | 0.19 | 6.32 |
| Non-breeding and Annual | Applicant | 1 | 0.9660 | 0.9994 | 0.9787 | 0.06 | 2.13 |

14.9.3.75 These results indicate that this level of impact would not adversely affect the population and would only result in a slight reduction in the growth rate currently seen in the population. Given the background mortality rate of 16.3% (see Table 14.16), the additional impact from the Offshore Project is considered to be within the range of natural population fluctuations. Great northern diver, like many long-lived seabirds, experience year-to-year variability in survival and productivity due to environmental factors. PVA simulations suggest that such a small change in survival would not significantly alter long-term population trends or increase extinction risk. As such, the effect would be undetectable against natural variation, and the magnitude of impact is considered to be negligible.

Sensitivity of VOR

- 14.9.3.76 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.
- 14.9.3.77 In terms of behavioural response to wind farm structures, great northern diver is considered to have a very high vulnerability to displacement, being assigned a score of 5 (out of 5) by Wade *et al.* (2016). However, great northern diver receives a score of 3 (out of 5) for habitat flexibility, which indicates a moderate degree of flexibility to forage in alternative habitats and therefore mitigate the negative effects resulting from displacement. Vulnerability is therefore high (Table 14.10).
- 14.9.3.78 Great northern diver typically reach maturity at 6 years old and have a single brood of 1-3 eggs (BTO, 2025). Although great northern diver do not breed in the UK, their wintering distribution and abundance has increased (BTO, 2025). They are therefore considered to have medium recoverability (Table 14.9).
- 14.9.3.79 There is not expected to be connectivity between the Offshore Project and any SPA designated for great northern diver. Great northern diver is listed on Annex I of the Birds Directive. Great northern diver is therefore considered to be of national conservation value.
- 14.9.3.80 Great northern diver is deemed to be of high vulnerability (high sensitivity was determined above due to their medium habitat flexibility), medium recoverability, and national value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

- 14.9.3.81 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

- 14.9.3.82 No additional mitigation measures for great northern diver are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Gannet

Magnitude

- 14.9.3.83 The magnitude of impact is based on the criteria detailed in Table 14.7. For gannet in all 3 seasons (breeding, post breeding, and pre-breeding) and on an annual basis, the estimated percentage point increase in baseline mortality remains below the 0.02% point increase threshold as defined by NatureScot (Table 14.40). This conclusion is applicable when modelling using the parameters advocated for by both NatureScot and the Applicant, both of which are included in Table 14.40.

Table 14.40: Assessment of predicted displacement mortality estimates for gannet on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Displacement Mortality (No. of Birds) | Change in Baseline Mortality (% Point Change) |
|--|---|--------------------|---------------------------------------|---|
| NatureScot (70% displacement; 1-3% mortality) | | | | |
| Breeding | 922,238 | 0.193 | 3–9 | <0.001–0.001 |
| Post-breeding | 545,954 | | 3–8 | <0.001–0.002 |
| Pre-breeding | 661,888 | | 0–1 | 0.000–<0.001 |
| Annual | 922,238 | | 6–18 | <0.001–0.002 |
| Applicant (70% displacement; 1% mortality) | | | | |
| Breeding | 922,238 | 0.193 | 3 | <0.001 |
| Post-breeding | 545,954 | | 3 | <0.001 |
| Pre-breeding | 661,888 | | 0 | <0.001 |
| Annual | 922,238 | | 6 | <0.001 |

14.9.3.84 The total displacement impact is predicted to result in a very slight change to the baseline mortality of the biogeographic population of gannet for both the NatureScot and Applicant Approach. The impact is predicted to be of local spatial extent, long-term duration, continuous, and of high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be negligible.

Sensitivity of VOR

14.9.3.85 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.

14.9.3.86 In terms of behavioural response to wind farm structures, gannet is considered to have a high vulnerability to displacement, being assigned a score of 4 (out of 5) by Wade *et al.* (2016). During the breeding season, gannet have also shown a strong avoidance of OWFs (Peschko *et al.*, 2021). Overall, it is considered that gannet have a high vulnerability to displacement (Table 14.10).

14.9.3.87 Gannet have low reproductive potential given a typical age of first breeding of 5 years and typically laying only a single egg per breeding season. However, although gannet has a low reproductive potential, the species has demonstrated a consistent increasing trend in abundance since the 1990s (JNCC, 2020). It is of note that the species has suffered from the outbreak of avian flu during the 2022 breeding season (Pearce-Higgins *et al.*, 2023), with declines of 25% recorded at certain sites in Britain in 2023 when compared against a pre-HPAI baseline (Tremlett *et al.*, 2024). Therefore, whilst the overall population has shown steady growth, HPAI has led to some short-term declines. Therefore, overall gannet is deemed to have medium recoverability (Table 14.9).

14.9.3.88 Gannet is a qualifying interest for several SPAs likely to be connected to the Offshore Project (within the mean-max + SD foraging range). The species is therefore considered to be of international value. Refer to Table 14.17 for details of SPAs with connectivity to the Offshore Project with regards to gannet.

14.9.3.89 Gannet is deemed to be of high vulnerability, medium recoverability, and of international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.9.3.90 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.9.3.91 No additional mitigation measures for gannet are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

14.9.4 COLLISION AND DISPLACEMENT COMBINED

14.9.4.1 A total of 2 species, kittiwake and gannet, are considered to be at risk from both collision and displacement during the O&M phase, as they were assessed for collision and distributional responses (displacement). To better understand the magnitude of the potential impact on these species, the predicted effects of both collision and displacement have been combined.

14.9.4.2 It is recognised that assessing these 2 potential impacts together could amount to double counting, as birds that are subject to displacement could not be subject to potential collision risk as they are already assumed to have not entered the Turbine Area. Equally, birds estimated to be subject to collision risk mortality would not be subjected to displacement mortality as well. It is noted that this has been partially addressed through the use of a 70% macro-avoidance factor within the collision assessment applied to gannet in the non-breeding season. However, no macro-avoidance has been applied to kittiwake, nor to gannet in the breeding season. The results presented in this section are therefore still considered precautionary.

Kittiwake

Magnitude

14.9.4.3 The magnitude of impact is based on the criteria detailed in Table 14.7. To calculate the combined impact on kittiwake the impacts presented within Table 14.23 for collision impact and Table 14.23 for displacement impact have been summed together.

- 14.9.4.4 In all 3 seasons (pre-breeding, breeding and post breeding) and also on an annual basis, the estimated increase in baseline mortality remains well below the 0.02% point increase threshold as defined by NatureScot (Table 14.41). The largest impact (up to 29.5 birds), when considering NatureScot’s upper scenario would , result in an 0.003 percentage point increase in mortality.
- 14.9.4.5 The impact is predicted to be of local spatial extent, long-term duration, continuous and reversible. It is predicted that the impact will affect the receptor directly. The magnitude is considered to be negligible.

Table 14.41: Assessment of predicted combined collision risk and displacement impacts for kittiwake on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Combined Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|---|---|--------------------|-----------------------------------|--|
| NatureScot approach to displacement (30% displacement; 1-3% mortality) | | | | |
| Breeding | 221,825 | 0.156 | 0.9-0.9 | <0.001 |
| Post-breeding | 911,586 | | 7.7-8.7 | <0.001 |
| Pre-breeding | 691,526 | | 16.0-20.0 | 0.002-0.003 |
| Annual | 911,586 | | 24.5-29.5 | 0.003-0.003 |
| Applicant approach to displacement (30% displacement; 1% mortality) | | | | |
| Breeding | 221,825 | 0.156 | 0.9 | <0.001 |
| Post-breeding | 911,586 | | 7.7 | <0.001 |
| Pre-breeding | 691,526 | | 16.0 | 0.002 |
| Annual | 911,586 | | 24.5 | 0.003 |

Sensitivity of VOR

- 14.9.4.6 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.
- 14.9.4.7 Kittiwake was rated as highly vulnerable to collision impacts by Wade *et al.* (2016), due to the proportion of flights likely to occur at potential risk height and percentage of time in flight. In terms of nocturnal activity rate, kittiwake is considered to have a medium rate of activity at night with a score of 3 (out of 5) (Wade *et al.*, 2016) (Table 14.10).
- 14.9.4.8 In terms of behavioural response to OWF structures, kittiwake is considered to have a low vulnerability to displacement, with a score of 2 (out of 5) assigned by Wade *et al.* (2016). They also have moderately high habitat flexibility, with a score of 2 (out of 5; where 1 indicates the most habitat flexibility), which reduces their vulnerability to negative impacts as a result of being displaced (Table 14.10).

- 14.9.4.9 Overall, considering the high vulnerability to collision but low vulnerability to displacement, kittiwake is considered to have medium vulnerability to combined collision plus displacement.
- 14.9.4.10 Kittiwake lay 2 eggs and breed from the age of 4 onwards, typically living on average for 12 years (Burnell *et al.*, 2023). Kittiwake have undergone decreases of approximately 57% in Scotland/*Alba* since the early 2000s. Surveys managed by the RSPB in 2023 have recorded indicative increases of 8% across a number of sites in Britain in 2023 when compared against a pre-HPAI baseline (Tremlett *et al.*, 2024). Overall, kittiwake is deemed to have low recoverability (Table 14.9).
- 14.9.4.11 Kittiwake is a qualifying interest for several SPAs likely to be connected to the Offshore Project (within the mean-max + SD foraging range), with several non-SPA colonies also within range and so the species is considered to be of international conservation value. Refer to Table 14.17 for details of SPAs with connectivity to the Offshore Project with regards to kittiwake.
- 14.9.4.12 Kittiwake is deemed to be of medium vulnerability, low recoverability, and international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

- 14.9.4.13 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

- 14.9.4.14 No additional mitigation measures for kittiwake are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Gannet

Magnitude

- 14.9.4.15 To calculate the combined impact on gannet the impacts presented within Table 14.29 for collision impact and Table 14.40 for displacement impact have been summed together.
- 14.9.4.16 For gannet in all 3 seasons (breeding, post breeding, and pre-breeding) and on an annual basis, the estimated percentage point increase in baseline mortality remains below the 0.02 percentage point increase threshold as defined by NatureScot (Table 14.42). This conclusion is applicable when modelling using the parameters advocated for by both NatureScot and the Applicant.

Table 14.42: Assessment of predicted combined collision and displacement mortality estimates for gannet on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Baseline Mortality | Combined Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|--|---|--------------------|-----------------------------------|--|
| NatureScot approach to displacement (70% displacement; 1-3% mortality) | | | | |
| Breeding | 922,238 | 0.193 | 24.9-30.9 | 0.003-0.003 |
| Post-breeding | 545,954 | | 4.2-9.2 | <0.001-0.002 |
| Pre-breeding | 661,888 | | 0.2-1.2 | <0.001 |
| Annual | 922,238 | | 29.3-41.3 | 0.003-0.004 |
| Applicant approach to displacement (70% displacement; 1% mortality) | | | | |
| Breeding | 922,238 | 0.193 | 24.9 | 0.003 |
| Post-breeding | 545,954 | | 4.2 | <0.001 |
| Pre-breeding | 661,888 | | 0.2 | <0.001 |
| Annual | 922,238 | | 29.3 | 0.003 |

14.9.4.17 The total combined collision and displacement risk impact is predicted to result in a very slight change to the baseline mortality of the population of gannet. The impact is predicted to be of local spatial extent, long-term duration, continuous, and of high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be negligible.

Sensitivity of VOR

14.9.4.18 The sensitivity described for each VOR is based on the criteria provided in Table 14.12.

14.9.4.19 In terms of behavioural response to wind farm structures, gannet is considered to have a high vulnerability to displacement, being assigned a score of 4 (out of 5) by Wade *et al.* (2016) (Table 14.10).

14.9.4.20 Although the latest scientific guidance showed the species to display a high level of macro-avoidance (Peschko *et al.*, 2020), the species is rated as relatively vulnerable to collision impacts by Wade *et al.* (2016) (Table 14.10).

14.9.4.21 Overall, considering the high vulnerability to collision and high vulnerability to displacement, gannet is considered to have high vulnerability to combined collision plus displacement.

14.9.4.22 Gannet have low reproductive potential given a typical age of first breeding of 5 years and typically laying only a single egg per breeding season. However, although gannet has a low reproductive potential, the species has demonstrated a consistent increasing trend in abundance since the 1990s (JNCC, 2020). It is of note that the species has suffered from the outbreak of avian flu during the 2022 breeding season (Pearce-Higgins *et al.*, 2023), with declines of 25% recorded at certain sites in Britain in 2023 when compared against a pre-HPAI baseline (Tremlett *et al.*, 2024). Therefore, whilst

the overall population has shown steady growth, HPAI has led to some short-term declines. Therefore, overall gannet is deemed to have medium recoverability (Table 14.9).

14.9.4.23 Gannet is a qualifying interest for several SPAs likely to be connected to the Turbine Area (within the mean-max + SD foraging range). The species is therefore considered to be of international value. Refer to Table 14.17 for details of SPAs with connectivity to the Turbine Area with regards to gannet.

14.9.4.24 Gannet is deemed to be of high vulnerability, medium recoverability, and of international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.9.4.25 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.9.4.26 No additional mitigation measures for gannet are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

14.9.5 BARRIER EFFECT

14.9.5.1 JNCC *et al.* (2022a) defines barrier effects as “a physical factor that limits the migration, or free movement of individuals or populations, thus requiring them to divert from their intended path in order to reach their original destination. This effect is expected to increase the energy expenditure of birds if they have to fly around the area in question in order to reach their goal”. It is typically considered to affect birds in flight only, either whilst they are on migration between breeding and wintering areas (for example) or between a breeding colony and a foraging area. The latter of these scenarios may impose an additional energetic cost to movements at a key period in the annual cycle when seabirds are making daily commutes between foraging grounds at sea and breeding sites. Additional energetic costs could have long-term implications for individuals, impacting bird fitness (breeding productivity and survival) and for populations. Barrier effects are considered to be less impactful when affecting migratory flights, as avoidance of a single wind farm may be trivial relative to the total length and cost of the entire migratory journey which can be several 1000s of kilometres long.

14.9.5.2 For breeding seabirds, NatureScot (2023f) consider barrier effects alongside displacement as “distributional responses”. This is because it can be difficult to distinguish barrier effects from the effects of displacement, for breeding seabirds foraging in the region. NatureScot (2023f) advise that distributional responses are assessed using the matrix approach, and therefore for breeding

seabirds assessed in Section 14.9.3 for displacement, no separate assessment of barrier to movement is carried out. This section therefore only considers the impact of the barrier to movement on migratory birds and fulmar, in line with NatureScot comments (see rows regarding the consultation on 16 April 2025 within Appendix 14.6, Volume 2c).

- 14.9.5.3 Because the magnitude of barrier effects is likely to be similar amongst bird species moving through the area, all receptors are grouped for the assessment of the barrier effect.

Magnitude of Impact

- 14.9.5.4 The magnitude of impact is based on the criteria detailed in Table 14.7.
- 14.9.5.5 In the absence of quantitative information from the Offshore Project, the magnitude is considered qualitatively for all screened in receptors (Table 14.3).
- 14.9.5.6 Barrier effects associated with the Offshore Project differ depending on the type of flight. Diversions during migratory flights are generally less impactful than diversions of daily foraging flights, as birds migrate infrequently and are less energetically constrained over a single flight. Several studies, including Masden *et al.* (2010) and Speakman *et al.* (2009), suggest that the energetic costs of one-off avoidances during migration are small, typically accounting for less than 2% of available fat reserves.
- 14.9.5.1 Seabirds with high wind loadings, such as cormorant, experience the highest per unit flight energetic costs (Masden *et al.* 2010). Energy efficient gliders, such as gannets, incur smaller increases in energy expenditure. For example, results suggest that increasing gannet flight distance by 2 km increases energetic cost by 1.25%, while a 10 km increase corresponds to a 4.50% increase in energy expenditure. However, this is based on a foraging range of 160 km, where 10 km represents a 6.25% increase in distance flown. Scaling this to the mean maximum plus 1 SD foraging range of 709 km (Woodward *et al.*, 2019), an additional flight distance of 10 km (4.5%) represents a scaled 1.02% increase in expenditure. This minimal increase in energy expenditure is unlikely to result in notable mortalities. Most importantly, Masden *et al.* (2010) found costs of extra flight to avoid a wind farm to appear to be much less than those imposed by low food abundance or adverse weather, although such costs will be additive to these.
- 14.9.5.2 As requested by NatureScot (see rows regarding the consultation on 16 April 2025 within Appendix 14.6, Volume 2c), fulmar was included within the assessment for barrier effects. Fulmar use winds and turbulence to soar and glide effortlessly over the sea. For example, a study by Furness and Bryant (1996) has demonstrated that under suitable conditions with a reasonable wind of 20 miles an hour, fulmar can glide with minimal flapping (approximately 1 flap per second), leading to energy expenditures as low as those associated with sitting on a nest. A further increase in wind speed to 25 miles per hour requires no flapping at all (Nicholson, 2017). Results suggest that increasing fulmar flight distance by 2 km increases energetic cost by 0.7%. A 10 km increase

may result in a 3.4% increase in energy expenditure. However, this is based on a foraging range of 184 km, where 10 km represents a 5.4% increase in distance flown (Masden *et al.*, 2010). Scaling this to the mean maximum + 1 SD foraging range of 1,200.2 km (Woodward *et al.*, 2019), an additional flight distance of 10 km represents a scaled 0.5% increase in expenditure. This minimal increase in energy expenditure is unlikely to result in notable mortalities. Most importantly the authors found costs of extra flight distance to avoid a wind farm to appear to be much less than those imposed by low food abundance or adverse weather, although such costs will be additive to these.

14.9.5.3 In addition, the RSPB Outer Hebrides regional group (email sent to the Applicant, 9 September 2025) have raised concerns about shearwater species (incidental observations of large numbers of sooty shearwater *Ardenna grisea*, Cory's shearwater *Calonectris diomedea* and great shearwater *Puffinus gravis*).

14.9.5.4 Sooty shearwater, Cory's shearwater, and great shearwater do not forage within UK waters whilst breeding (Olney and Scofield, 2016). However, non-breeding birds are regularly recorded in UK waters (especially in the southwest) in the late summer months:

- Sooty shearwater breed in the southern hemisphere, and then post-breeding they circumnavigate the Atlantic Ocean flying north along the eastern seaboard of the United States of America, before returning south past UK and Ireland, only coming close to shore in autumnal westerly gales (BTO, 2025).
- Cory's shearwater breed across the Atlantic archipelagos (e.g. the Azores, Canaries, Salvagens, and Berlengas). Birds start to leave these colonies during August, with many heading for the Bay of Biscay. In years when large numbers occur in the Bay of Biscay some birds head further north and are responsible for increased sightings around our coasts. Cory's Shearwaters spend the winter off the coasts of South America and South Africa before returning to their breeding colonies (BTO, 2025).
- Great shearwater breed on an island in the South Atlantic and leave their breeding sites from March or early April, undertaking a huge flight that will see them complete a clockwise loop around the Atlantic, before heading back to their breeding islands. These birds typically arrive in UK and Irish waters during August. Many individuals head to the Bay of Biscay, where large numbers can congregate through to October. These are thought to be non-breeding birds because breeding has already commenced in the South Atlantic colonies by October (BTO, 2025).

14.9.5.5 All 3 shearwater species undergo huge non-breeding journeys, occasionally passing through UK waters. It can be concluded with confidence that the barrier effects caused by the Offshore Project would have an imperceptible impact on the flight distances of these wandering non-breeding shearwaters, and therefore would have a negligible impact on their survival.

14.9.5.6 The impact on all species assessed is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. It is predicted that the impact will affect the receptors directly. Due to the likely absence of any detectable impact on the fitness of individuals and the demography of the populations, the magnitude is therefore considered to be negligible for all assessed species.

Sensitivity of VORs

14.9.5.7 The sensitivity of receptors considered for barrier effects will vary between species, with some species having higher sensitivity levels than others (Table 14.10).

14.9.5.8 Although direct evidence is limited, Woodward *et al.* (2023) recommends applying avoidance rates greater than 0.98 for all species in CRM. This high avoidance rate suggests that most species are likely to modify their flight behaviour in response to wind turbines. While these avoidance rates cover all spatial scales, there is specific evidence for macro avoidance in some species, meaning changes in flight paths to avoid the entire wind farm area. This indicates that barrier effects could occur for many species.

14.9.5.9 However, Dierschke *et al.* (2016) found that species responses can vary, with some attracted to and others deterred from OWFs. Their study, which assessed behavioural responses at 20 wind farms in European waters, concluded that responses differed by site and species. For example, kittiwake, great black-backed gull, and herring gull showed low sensitivity to barrier effects, with little or no disruption in their distribution across wind farms. In contrast, species such as guillemot, razorbill, puffin, red-throated diver, great northern diver, fulmar, Manx shearwater, and gannet displayed clearer evidence of displacement and barrier effects.

14.9.5.10 For migratory seabirds and waterbirds, Dierschke *et al.* (2016) identified low to very low sensitivity to barrier effects for those species included in their analysis (Table 14.10). For migratory species not covered in the study, such as certain waterbirds, vulnerability is considered medium.

14.9.5.11 Recoverability of populations of migrants may vary considerably, with smaller wader species with a relatively favourable conservation status (e.g. dunlin) faring better than larger species with lower reproductive rates (e.g. Eurasian curlew).

14.9.5.12 Migratory birds are deemed to be of very low to medium vulnerability, low to high recoverability and local to international value. On a precautionary basis and for the purposes of this assessment these species are assumed to have high sensitivity to barrier effects (i.e. medium vulnerability, low recoverability and international value).

14.9.5.13 Overall therefore, the sensitivity to barrier effects ranges from low to high sensitivity depending on the species.

Significance of effect

14.9.5.14 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be low to high. In some instances this would lead to an impact with a significance of minor, or negligible to minor; however, due to the limited magnitude of any potential impacts, the effect is considered to be of minor adverse significance for all receptors, which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.9.5.15 No additional mitigation measures for any receptors are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

14.9.6 LONG-TERM HABITAT LOSS

14.9.6.1 As a result of the construction of the Offshore Project, some areas of marine habitat will be permanently altered or lost for the entire operational period of the development. These areas include those directly occupied by the physical footprint of the wind turbines and associated offshore infrastructure, such as Offshore Cables. The assessment of this impact pathway considers the potential long-term effects of habitat loss on Marine and Nearshore Ornithological receptors. These receptors include VORs, migratory seabirds, and migratory waterbirds, all of which may interact with the development area during different life stages or seasonal movements. For the purposes of this assessment, these groups have been considered collectively, as they are subject to similar pressures and potential pathways of effect arising from habitat loss.

14.9.6.2 It should be noted that whilst these areas may be altered from their original habitat type for the lifespan of the Offshore Project, wind turbines and the substrates used for scour protection and cable protection can act as a habitat in their own right (e.g. Degraer *et al.*, 2020).

14.9.6.3 Habitat loss is mostly accounted for within the assessment of distributional responses, whereby birds are displaced from areas of potential foraging habitat. This impact is assessed in Section 14.9.2.80 In addition, indirect effects on birds via impacts on prey are also considered separately, in Section 14.8.3. This assessment therefore only related to impacts on birds that are not displaced, and that are directly reliant on habitats that are lost or altered.

Magnitude of impact

14.9.6.4 The magnitude of impact is based on the criteria detailed in Table 14.7.

14.9.6.5 In the absence of quantitative information available for individual species, the magnitude is considered qualitatively for all receptors.

- 14.9.6.6 As set out in Table 14.18, the maximum permanent footprint of the Offshore Project consists of 661,500 m² for wind turbines (and associated scour protection) and 1,750,000 m² for cables (including surface protection). The total area of the Offshore Project Boundary (Array Area plus OCAS) is approximately 208 km². The total amount of habitat lost therefore represents approximately 1.16% of the habitat within the Offshore Project Boundary.
- 14.9.6.7 The available habitat within the Offshore Project Boundary is defined as the total seabed area of the Array Area and OCAS, which predominantly comprises circalittoral rock and other hard substrates, with smaller pockets of coarse sediment and kelp-dominated sublittoral fringe rock. These habitats are typical of the wider region and occur extensively beyond the Offshore Project Boundary.
- 14.9.6.8 The majority of the permanent change represents a shift from natural hard substrate to artificial hard substrate (e.g., concrete or rock scour protection), rather than complete removal. This means that while physical structure and ecological character are altered, some ecological function remains, and recolonisation by epifaunal species is expected. Limited areas of soft sediment or mixed habitat will be permanently lost, but these features are not unique and are well represented in adjacent
- 14.9.6.9 Recoverability of populations of may vary considerably, with smaller species with a relatively favourable conservation status (e.g. razorbill) faring better than larger species with lower reproductive rates (e.g. fulmar).
- 14.9.6.10 The VORs considered vary in their conservation value from local to international.
- 14.9.6.11 On a precautionary basis and purposes of this assessment, the receptors are assumed to have high sensitivity to habitat loss (i.e. medium vulnerability, low recoverability and international value).

Significance of effect

- 14.9.6.12 Overall, the magnitude of the impact is deemed to be negligible and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

- 14.9.6.13 No secondary mitigation is considered necessary because the likely effect in the absence of secondary mitigation is not significant in EIA terms.

14.9.7 RESPONSE TO ARTIFICIAL LIGHTING

- 14.9.7.1 The scientific evidence regarding the impact 'response to artificial lighting' is fully presented within Section 14.8.4, and not repeated here to avoid duplication within this Chapter. Section 14.8.4 covers impacts during the construction phase; all impacts that occur during the construction phase will

continue to occur during the O&M phase. However, instead of the regular nocturnal working with multiple vessels associated with construction, at the O&M phase, nocturnal working will only happen in an emergency, with all regular maintenance occurring during daylight hours for operational safety reasons. The navigational lighting of the wind turbines and an OSP (if required) installed during the construction phase will continue to operate during the O&M phase across the 60 wind turbines.

14.9.7.2 The effects of response to artificial lighting in the O&M phase are therefore expected to be the same as, or less than, the impacts at the construction phase, as the construction phase is expected to involve greater light levels associated with the multiple construction vessels (Deakin *et al.*, 2022; DCCEEW, 2023). The lighting of the wind turbines (as presented in Table 14.18 and Appendix 16.3, Volume 2c) is not considered to be at a level which would elicit phototaxis or disorientation (Furness, 2018).

14.9.7.3 The assessment for response to artificial lighting in the O&M phase is based on a qualitative approach, considering the magnitude of impact and the sensitivity of the receptor. The species considered for attraction to light are the same as for Section 14.8.4 and are identified based on the species vulnerability (Wade *et al.*, 2016; Table 14.10).

Magnitude of impact

14.9.7.4 For all receptors considered within Section 14.8.4, the magnitude of impact during the O&M phase is expected to be less than during construction due to the decreased potential for impacts, as explained in paragraph 14.9.7.1. Therefore, the assessment for all receptors remains unchanged between the construction phase and the O&M phase, and it is concluded that the magnitude of impact is negligible.

Sensitivity of receptors

14.9.7.5 As presented within Section 14.8.4, the sensitivity of the receptors to the impact was considered to be medium to high. The assessment for all receptors remains unchanged between the construction phase and the O&M phase. No additional receptors are assessed during the O&M phase.

Significance of effect

14.9.7.6 For the Offshore Project, the species considered in relation to response to artificial lighting during the operational phase (fulmar, Manx shearwater, storm petrel, and Leach's petrel) show varying sensitivities, with Manx shearwater and storm petrel assessed as having medium sensitivity, and fulmar and Leach's petrel as having high sensitivity, while the magnitude of impact considered negligible for all species. For species with high sensitivity, a minor adverse significance is concluded. For species where the range includes negligible to minor, negligible significance is applied. This reflects the very low-intensity lighting associated with offshore structures, the distance from breeding colonies, the short seasonal window when fledglings may be vulnerable, and the fact

that adults are generally unaffected. A negligible adverse significance is therefore considered appropriately precautionary. The effect therefore ranges from negligible to minor adverse significance based on the species, and is not significant in EIA terms.

Further environmental mitigation and residual effect

14.9.7.7 No additional mitigation measures for any receptors are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19 is not significant in EIA terms.

14.10 ASSESSMENT OF EFFECTS: DECOMMISSIONING

14.10.1 INTRODUCTION

14.10.1.1 As presented within Table 14.3, there are 3 scoped in effects during the decommissioning phase, these are:

- Temporary habitat loss, disturbance and displacement (see Section 14.8.2)
- Indirect effects through effects on prey (see Section 14.8.3);
- Response to artificial lighting (see Section 14.8.4).

14.10.1.2 These 3 effects will occur throughout the whole Offshore Project Boundary for the duration of the decommissioning phase (Table 14.18).

14.10.1.3 A summary of the effects and conclusions presented for the Offshore Project alone assessment is presented in Section 14.15.

14.10.2 TEMPORARY HABITAT LOSS AND DISTURBANCE

14.10.2.1 Decommissioning activities within the Offshore Project Boundary are equal to or less than those carried out during the construction phase for the Offshore Project (see Section 14.8.2). Therefore, for the purpose of this assessment it is assumed that the level of temporary habitat loss and disturbance is likely to be similar if not less, and the potential impact is deemed to be reversible in the short-term as birds are likely to return when activities have been completed.

Significance of effect

14.10.2.2 Overall, the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptors is considered to be medium to high. The effect is therefore assessed as being of negligible to minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.10.2.3 No mitigation measures for Marine and Nearshore Ornithology are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19 is not significant in EIA terms.

14.10.3 INDIRECT EFFECTS THROUGH EFFECTS ON PREY SPECIES

14.10.3.1 Decommissioning activities within the Offshore Project Boundary are equal to or less than those carried out during the construction phase for the Offshore Project (see Section 14.8.3). Therefore, for the purpose of this assessment it is assumed that the level of indirect impacts on ornithology receptors through the effect on prey species is likely to be similar if not less, and the potential impact is deemed to be reversible in the short-term as birds and prey are likely to return when activities have been completed.

Significance of effect

14.10.3.2 Overall, the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptors is considered to be low to medium. The effect will, therefore, be of negligible adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.10.3.3 No mitigation measures for Marine and Nearshore Ornithology are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19 is not significant in EIA terms.

14.10.4 RESPONSE TO ARTIFICIAL LIGHTING

14.10.4.1 The scientific evidence regarding the impact 'response to artificial lighting' is fully presented within Section 14.8.4, and not repeated here to avoid duplication within this Chapter. Section 14.8.4 covers impacts during the construction phase; the level of response to artificial lighting at the decommissioning expected to be the same as, or less than, the impacts at the construction phase, as the construction phase is expected to involve greater light levels associated with the multiple construction vessels (Deakin *et al.*, 2022). Furthermore, at the decommissioning phase, the potential impact is deemed to be reversible in the short-term as birds are likely to return when activities have been completed.

14.10.4.2 The assessment for response to artificial lighting in the decommissioning phase is based on a qualitative approach, considering the magnitude of impact and the sensitivity of the receptor. The species considered for attraction to light are the same as for Section 14.8.4 and are identified based on the species vulnerability (Wade *et al.*, 2016; Table 14.10).

Magnitude of the impact

14.10.4.3 For all receptors considered within Section 14.8.4, the magnitude of impact during the decommissioning phase is expected to be less than during construction due to the decreased potential for impacts, as explained in paragraph 14.9.7.1. Therefore, the assessment for all receptors remains unchanged between the construction phase and the decommissioning phase, and it is concluded that the magnitude of impact is negligible.

Sensitivity of receptors

14.10.4.4 As presented within Section 14.8.4, the sensitivity of the receptors to the impact was considered to be medium to high. The assessment for all receptors remains unchanged between the construction phase and the decommissioning phase. No additional receptors are assessed during the decommissioning phase.

Significance of effect

14.10.4.5 Overall for the Offshore Project, for all species being considered for response to artificial lighting in the decommissioning phase (fulmar, Manx shearwater, storm petrel, Leach's petrel), it is predicted that the sensitivity is medium for manx shearwater, and storm petrel, and high for fulmar and Leach's petrel and the magnitude is negligible. The effect is therefore of negligible to minor adverse significance, which is not significant in EIA terms.

Further environmental mitigation and residual effect

14.10.4.6 No additional mitigation measures for any receptors are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19 is not significant in EIA terms.

14.11 ASSESSMENT OF COMBINED EFFECTS

14.11.1.1 Combined effects refer to the inter-relationships between EIA aspects that may lead to different or greater environmental effects than in isolation. Such effects are concerned with the likely significant effects from multiple impacts and activities from construction, operation and maintenance, and decommissioning of the Offshore Project on the same receptor, or group of receptors. For instance, a seabird or water bird species might be affected by the temporary disturbances from construction activities, noise pollution, and traffic disruptions. The combined impact of these effects can be more significant than each individual effect on its own.

14.11.1.2 It is not necessarily the case that the maximum adverse impact in terms of any one aspect impact would automatically result in the maximum potential impact when a number of aspect impacts are considered collectively. In addition, individual impacts may not be significant but could become significant when their inter-relationship is assessed.

14.11.1.3 Full results of the Project lifetime effects and receptor-led effects assessment can be found in Chapter 23: Combined and Whole Project Effects Assessment, Volume 4a.

14.11.2 APPROACH

14.11.2.1 This section outlines the approach taken to assess potential receptor-led and project-lifetime effects arising from the Offshore Project. These combined effects are considered to ensure that interactions between project activities and receptors are fully understood and appropriately assessed.

14.11.2.2 The assessment considers 2 key types of combined effects:

- Project-lifetime effects: Effects that occur throughout more than one phase of the Project (during construction, operation and decommissioning) upon a receptor, as well as effects that overlap spatially and/or temporally;
- Receptor-led effects: : Effects that occur through the combined impacts of multiple factors on a single receptor (or group). These effects are identified by examining potential interactions, spatially and temporally, associated with the Offshore Project. As an example, all effects on offshore ornithology, such as collision with rotating blades and displacement, may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Such effects may be short-term, temporary or transient or may persist over a longer duration.

14.11.2.3 The assessment followed a structured methodology comprising the following steps:

- Review of effects for individual EIA topic areas;
- Review of the assessment carried out for each EIA topic area, to identify if a receptor is impacted through more than one effect;
- Development of lists for all potential receptor-led effects;
- Qualitative assessment on how individual effects may combine to create combined effects.

14.11.2.4 It is important to note that this assessment considers only combined effects arising from the offshore components of the Offshore Project. Potential cumulative effects with other developments are addressed separately in Section 14.13. Potential combined effects from the Onshore Project and Offshore Project are addressed within the whole project assessment in Section 14.12.

14.11.3 PROJECT-LIFETIME EFFECTS ASSESSMENT

14.11.3.1 The construction, O&M and decommissioning phases of the Offshore Project may cause a range of effects on Marine and Nearshore Ornithological receptors. The magnitude of these effects has been assessed individually using expert judgement, drawing from a wide science base that includes project specific surveys and previously acquired knowledge of the bird ecology in Scottish waters.

14.11.3.2 These effects have the potential to form an intra-relationship, directly impacting the Marine and Nearshore Ornithology receptors. They also have the potential to manifest as sources for impacts upon receptors other than those considered within the context of Marine and Nearshore Ornithology.

14.11.3.3 Table 14.43 lists the project-lifetime effects that are predicted to arise during the construction, O&M, and decommissioning phases of the Offshore Project.

Table 14.43: Potential impacts for Marine and Nearshore Ornithology from individual project-lifetime effects occurring across the construction, O&M, and decommissioning phases of the Offshore Project

| Description of Impact | Phases | Likely Significant Project-lifetime Effects |
|--|----------------------------------|--|
| Temporary habitat loss and disturbance | Construction and decommissioning | <p>The majority of the habitat loss and disturbance during construction and decommissioning will be highly localised and the habitats affected are predicted to recover quickly following completion of construction and decommissioning activities. The construction phase is predicted to last 5 years, with decommissioning likely to occur over a similar timeframe or shorter.</p> <p>Decommissioning will occur at least 35 years after the finalisation of the construction phase therefore, across the lifetime of the Offshore Project, the effects on seabird receptors are not anticipated to interact in such a way as to result in project-lifetime effects of greater significance than the assessments presented for each individual phases. As a result, the project-lifetime effects are of minor adverse significance which is not significant in EIA terms.</p> |
| Indirect effects through effects on prey species | Construction and decommissioning | <p>The majority of the indirect impacts during construction and decommissioning will be highly localised and temporary. Decommissioning will occur at least 35 years after the finalisation of the construction phase therefore, across the lifetime of the Offshore Project, the effects on seabird receptors are not anticipated to interact in such a way as to result in effects</p> |

| Description of Impact | Phases | Likely Significant Project-lifetime Effects |
|--|--|---|
| | | <p>of greater significance than the assessments presented for each individual phase. As a result, the project-lifetime effects are of minor adverse significance which is not significant in EIA terms.</p> |
| Response to Artificial Lighting | Construction, O&M, and decommissioning | <p>Artificial light emissions are anticipated during the construction, O&M, and decommissioning phases of the Offshore Project. These impacts are assessed to be of minor adverse significance at worst. Given that construction and decommissioning activities are temporary and will not overlap with operational activities, there is no potential for these effects to combine across project phases in a way that would increase their overall significance.</p> <p>The nature of artificial light impacts is such that they are greatest during the construction and decommissioning phases associated with the marine vessels, but of a temporary, localised and transient nature. O&M light sources are less impactful due to the emitting light source (red-flashing lights (Table 14.19)), as a result, across the lifetime of the Offshore Project, the effects on sensitive receptors are not expected to interact in a manner that would lead to greater significance than assessed for each individual phase.</p> <p>The project-lifetime effects associated with artificial light are considered to be of minor adverse significance, which is not significant in EIA terms.</p> |
| Collision Risk | O&M | <p>This effect will only arise during the O&M phase, therefore no likely significant project-lifetime effects are anticipated across the lifetime of the Offshore Project.</p> |
| Distributional responses (displacement) associated with the Offshore Project | O&M | <p>This effect will only arise during the O&M phase, therefore no likely significant</p> |

| Description of Impact | Phases | Likely Significant Project-lifetime Effects |
|--|--------|--|
| | | project-lifetime effects are anticipated across the lifetime of the Offshore Project. |
| Barrier Effect | O&M | This effect will only arise during the O&M phase only, therefore no likely significant project-lifetime effects are anticipated across the lifetime of the Offshore Project. |
| Long-term habitat loss (i.e. duration of the Offshore Project) | O&M | This effect will only arise during the O&M phase only, therefore no likely significant project-lifetime effects are anticipated across the lifetime of the Offshore Project. |

14.11.3.4 There is no potential for the project-lifetime effects during different stages of the Offshore Project to interact in a way that would result in combined effects of greater significance than the assessments for each individual stage.

14.11.4 RECEPTOR-LED EFFECTS ASSESSMENT

14.11.4.1 In terms of how impacts to Marine and Nearshore Ornithology receptors may form receptor-led effects with other receptor groups (such as fish and benthic ecology), assessments of significance are provided in the chapters listed in the second column of Table 14.44. In addition, the table shows where other chapters have been used to inform the Marine and Nearshore Ornithology receptor-led effects assessment.

Table 14.44: Chapter topic receptor-led effects

| Impact Pathway | Related Chapter Used to Inform the Assessment |
|--|--|
| Temporary habitat loss and disturbance during construction and decommissioning | Chapter 11, Volume 2a and Chapter 12, Volume 2a: |
| Indirect effects through effects on prey species during construction and decommissioning | |
| Long-term habitat loss (i.e. operational duration of the project) during operation and maintenance | |

14.11.4.2 However, as none of the offshore impacts on prey species or habitat loss were assessed individually to have any greater than a minor adverse effect, it is considered highly unlikely that they will combine to form an overall significant effect on Marine and Nearshore Ornithology receptors.

14.11.4.3 In addition, the potential for combined effects from multiple impact pathways, such as collision risk and displacement, has been considered. These 2 effects are mutually exclusive at the individual bird

level: birds that are displaced from the Study Area are, by definition, not at risk of collision, and birds that collide with wind turbines were not displaced.

14.11.4.4 Accordingly, the Marine and Nearshore Ornithology assessment has considered all relevant impact pathways, including potential combined effects. No additional significant effects are predicted to arise from the combination of these impact pathways.

14.12 CONSIDERATION OF ONSHORE TRANSMISSION WORKS PROJECT

- 14.12.1.1 A separate application for onshore elements of the Project (the OTW Project), covering all infrastructure located landward of Mean Low Water Springs (MLWS) within the Onshore Transmission Works Boundary, will be submitted to Comhairle nan Eilean Siar (CnES) under the Town and Country Planning (Scotland) Act 1997. The OTW Project EIAR will provide a full description of the onshore components of the Project situated landward of MLWS and will include an assessment of the likely significant effects.
- 14.12.1.2 This whole project assessment considers the additive interactions between impacts on marine and nearshore ornithology receptors arising from both the Offshore Project and the OTW Project, to determine whether these combined effects could influence the overall assessment outcomes. The approach used to identify and assess potential interactions between the Offshore Project and the OTW Project is described in Chapter 5, Volume 1a, and key design parameters for the OTW Project are summarised in Chapter 3, Volume 1a.
- 14.12.1.3 The potential for effects identified in Table 14.46 to interact with effects associated with the OTW Project on a common receptor has been considered for marine and nearshore ornithology.
- 14.12.1.4 The Marine and Nearshore Ornithology receptors considered as part of the Offshore Project assessment are presented within Table 14.2. Within Table 14.2, there is also a justification if the receptor could also be affected by the OTW Project, alongside the Offshore Project. Only species which have an element of their lifecycle within the terrestrial environment have potential to be impacted by both the Offshore Project and the OTW Project. All receptors being considered breed terrestrially and therefore the results of the ornithological surveys undertaken between 2023 and 2025 for the OTW Project were reviewed to understand the breeding bird assemblage within the OTW Project Boundary. The ornithological survey methods, areas covered and results are presented in more detail within two unpublished reports by Atlantic58 (Atlantic58, 2024 and Atlantic58, 2025).

Table 14.45: Receptors requiring assessment for Marine and Nearshore Ornithology

| Receptor | Potential to be affected by the OTW Project |
|-------------------------|---|
| Kittiwake | No – kittiwake do not use terrestrial environments for foraging and no known breeding within the OTW Project Boundary. |
| Great black-backed gull | Yes – great black-backed gull have been recorded breeding/foraging within the OTW Project Boundary. |
| Herring gull | Yes – herring gull have been recorded breeding/foraging within the OTW Project Boundary. |
| Arctic tern | No – Arctic tern do not habitually use terrestrial environments for foraging and no known breeding within the OTW Project Boundary. |
| Guillemot | No – guillemot do not use terrestrial environments for foraging and no known breeding within the OTW Project Boundary. |
| Razorbill | No – razorbill do not use terrestrial environments for foraging and no known breeding within the OTW Project Boundary. |
| Puffin | No – puffin do not use terrestrial environments for foraging and no known breeding within the OTW Project Boundary. |
| Red-throated diver | Yes – red-throated diver breed on the lochs within the Lewis Peatlands SPA, which overlaps with the OTW Project Boundary. |
| Great northern diver | No – great northern diver do not breed within the UK and therefore do not use the terrestrial environments within the OTW Project Boundary. |
| Fulmar | Yes – fulmar do not use terrestrial environments for foraging, but small numbers were recorded breeding within the OTW Project Boundary near the Landfall. |
| Manx shearwater | No – Manx shearwater do not use terrestrial environments for foraging and no known breeding within the OTW Project Boundary. |
| Gannet | No – gannet do not use terrestrial environments for foraging and no known breeding within the OTW Project Boundary. |
| Migratory seabirds | No – migratory seabirds do not use the OTW Project Boundary during migration. |
| Migratory waterbirds | Yes – migratory waterbirds can forage within the OTW Project Boundary during their migration. Migratory non-bird species have been recorded breeding throughout the OTW Project Boundary. |

14.12.1.5 As presented within Table 14.2, great black-backed gull, herring gull, red-throated diver, fulmar and migratory waterbird species have potential to be impacted by both the Offshore Project and the OTW Project. Within this section these 5 receptors are known as the 'common receptors'. All other Marine and Nearshore Ornithology receptors are not considered further as there is no potential for an impact to occur across both the Offshore Project and the OTW Project.

14.12.1.6 Table 14.46 summarises the pathways considered in this section and the potential for interaction on the same common receptor. The common assessment pathways presented within Table 14.46

are split into construction, operation and maintenance and decommissioning, to align with how the Offshore Project alone assessment and OTW Project has been assessed. However, only pathways which are likely to occur within both the Offshore Project and OTW Project have been assessed. Where required, this table provides the relevant MDS information for the OTW Project (taken from Chapter 3, Volume 1a) that has been used to inform this assessment.

Table 14.46 Summary of effect pathways and potential for interaction between the Offshore Project and the OTW Project on the same common receptor

| Common assessment pathway | Maximum design scenario |
|--|---|
| Construction | |
| Temporary habitat loss and disturbance | <p><u>Offshore Project</u> See MDS within Table 14.8.</p> <p><u>OTW Project</u> As outlined in Section 3.6, Chapter 3, Volume 1a - construction works associated with:</p> <ul style="list-style-type: none"> - up to 13 Horizontal Directional Drilling (HDD) entry points near the coastal cliff at Barvas / <i>Barabhas</i> or <i>Barbhas</i> to connect to the Offshore Cable exit points; - Transition Joint Bays (TJB) to connect Offshore Cables (Export or Array to Landfall) to Onshore Cables; - an onshore temporary construction HDD compound (approximately 465 m x 480 m) and temporary access road; - up to 12 circuits of buried Onshore Cables will connect from the TJBs to the Landfall Substation (if required) located near Barvas / <i>Barabhas</i> or <i>Barbhas</i>; - Landfall Substation (if required) with a platform of approximately 150 m by 150 m and a maximum height of 15 m, plus several other, smaller buildings housing electrical and other equipment. Within the site compound, there will also be safety features such as lightning masts and access paths/roads; - permanent access road from the A857 to the Landfall Substation (if required); - onshore cabling from the Landfall Substation (if required) to the SSEN Lewis Hub, via Grid Substation, - TJBs every 500-1,500 m along the route, to join the cable sections together; - open cut trenching along the majority of the route, 12 sections of trenchless ranging from 125-600 m long; - Grid Substation northwest of Loch Cnoc a' Choilich. Grid Substation will consist of up to 6 buildings up to 20 m tall; - Construction of the OTW Project will last 36 months. |
| Operation and maintenance | |
| Long-term habitat loss | <u>Offshore Project</u> |

| | |
|--|---|
| Common assessment pathway | Maximum design scenario |
| Disturbance and displacement | See MDS within Table 14.8. <u>OTW Project</u> As outlined in Section 3.6, Chapter 3, Volume 1a - operation works associated with: <ul style="list-style-type: none"> - Repair and maintenance on up to 13 TJB to connect Offshore Cables (Export or Array to Landfall) to Onshore Cables; - Long-term presence of the Landfall Substation (if required option) and the Grid Substation northwest of Loch Cnoc a' Choilich. |
| Decommissioning | |
| Temporary habitat loss and disturbance | The decommissioning works are likely to be carried out in reverse to how the Offshore Project and OTW Project were constructed, albeit with some less impactful process (e.g no pilling) and therefore for assessment, the MDS is considered equal or less than the MDS for construction (see above). |

14.12.2 CONSTRUCTION

Temporary habitat loss and disturbance

Magnitude of impact

- 14.12.2.1 There is potential for temporary adverse effects associated with habitat loss and disturbance arising from the construction of the Offshore Project cumulatively with the OTW Project. The construction phase of the OTW Project will overlap with the construction phase of the Offshore Project. During the construction period, great black-backed gull, herring gull, fulmar, red-throated diver and migratory waterbirds may experience temporary habitat loss and disturbance as a result of both the Offshore Project and the OTW Project.
- 14.12.2.2 The Offshore Project construction assessment concluded that, following mitigation, the Offshore Project alone would result in a negligible magnitude impact, which is of minor adverse significance on red-throated diver due to temporary habitat loss and disturbance (Section 14.8.2). This was assessed as not significant in EIA terms.
- 14.12.2.3 Great black-backed gull, herring gull and migratory waterbirds were not specifically assessed within Section 14.8.2, but indirect effects through effects on prey species (Section 14.8.3), inherently includes an element of indirect habitat loss (as the habitat may no longer be suitable for prey and therefore not suitable for the birds also). The Offshore Project construction assessment concluded that, following mitigation, the Offshore Project alone would result in a negligible magnitude impact, which is of minor adverse significance on great black-backed gull, herring gull and

migratory waterbirds due to indirect effects through effects on prey species (Section 14.8.3). This was assessed as not significant in EIA terms.

- 14.12.2.4 The detailed designs of the OTW Project are not publicly available at the time of writing; therefore, the precise extent of temporary habitat loss and disturbance for the common receptors is unknown. However, great black-backed gull, herring gull, red-throated diver and migratory waterbirds have been recorded breeding within the OTW Project Boundary, and the construction route may pass through breeding territories.
- 14.12.2.5 For fulmar, habitat loss is not a likely pathway because breeding locations are restricted to coastal cliff habitats within the OTW Project Boundary, and HDD entry points are set back from the cliff edge; therefore, no cumulative habitat loss is anticipated for fulmar. However, the species could be temporarily disturbed by construction activities.
- 14.12.2.6 However, it is assumed that standard mitigation measures will be applied by the OTW Project, including adherence to the mitigation hierarchy, implementation of NatureScot's recommended radial distances from active nests, and full compliance with relevant wildlife legislation (e.g., no intentional harm to any breeding birds, and avoidance of disturbance to Schedule 1 species). All construction works will be undertaken following a Construction Environmental Management Plan and any work which has potential to temporarily impact the common receptors will be avoided, minimised or mitigated. Therefore, with these measures in place, the magnitude of temporary habitat loss and disturbance from the OTW Project for great black-backed gull, herring gull, fulmar, red-throated diver and migratory non-seabirds is expected to be negligible.
- 14.12.2.7 Given both the Offshore Project and the OTW Project can conclude that the magnitude of impact is expected to be negligible, it is also considered that the whole project assessment can conclude a negligible magnitude of impact.

Sensitivity of the receptors

- 14.12.2.8 The common receptors are considered to have low to high sensitivity to the temporary effects (see Table 14.20 and Table 14.21).

Significance of effect

- 14.12.2.9 Overall, the magnitude of the impact is deemed to be negligible for both the Offshore Project and OTW Project and the whole project assessment, and the sensitivity of the common receptors is considered to be low to high. The effect will, therefore, be of negligible to minor adverse significance, which is not significant in EIA terms.

14.12.3 OPERATION AND MAINTENANCE

Long-term habitat loss

Magnitude of impact

- 14.12.3.1 There is the potential for long-term adverse effects associated with habitat loss from the operation and maintenance of the Offshore Project cumulatively with the OTW Project. The operation and maintenance phase of the OTW Project will overlap with the operation and maintenance phase of the Offshore Project.
- 14.12.3.2 During the operation and maintenance phase, great black-backed gull, herring gull, red-throated diver and migratory waterbirds are impacted through long-term habitat loss as part of both the Offshore Project and OTW Project. The location of the fulmar breeding locations are not able to be directly lost (coastal cliffs) with the entrance points of the HDD set back from the cliff edge and therefore there is no potential for the OTW Project to have a cumulative impact with the Offshore Project for this species in regard to habitat loss.
- 14.12.3.3 Following the inclusion of mitigation measures, the Marine and Nearshore Ornithology assessment concluded that the impact of the Offshore Project on great black-backed gull, herring gull, red-throated diver and migratory waterbirds would result in an impact of negligible magnitude with the significance of effect concluding a minor adverse significance, which is not significant in EIA terms (Section 14.9.6).
- 14.12.3.4 The detailed designs of the OTW Project are not publicly available at the time of writing this assessment, therefore the extent of habitat that will be lost long-term for the common receptors is unknown. Long-term habitat loss associated within the OTW Project will only occur within the footprint of the Landfall Substation (if this option is selected) and the Grid Substation, all of the cabling will be underground and therefore will not result in any habitat loss during the operation and maintenance phase. Great black-backed gull, herring gull, red-throated diver and migratory waterbirds have been recorded breeding within the OTW Project Boundary and therefore there is potential that the permanent infrastructure (Landfall Substation and Grid Substation) could be located within a breeding territory.
- 14.12.3.5 However, it is assumed that standard mitigation measures will be implemented by the OTW Project which would apply the mitigation hierarchy to avoid harm and restrict building within the areas which result in the largest loss of habitually used (for foraging or breeding) land. The two substations (Landfall Substations and Grid Substation) are likely to occupy a small area of land in comparison to similar habitat within the immediate vicinity. Therefore, with these measures in place and the minor area lost, the magnitude of long-term habitat loss for great black-backed gull, herring gull, red-throated diver and migratory non-seabirds resulting from the OTW Project is expected to be negligible.

14.12.3.6 Given both the Offshore Project and the OTW Project can conclude that the magnitude of impact is expected to be negligible, it is also considered that the whole project assessment can conclude a negligible magnitude of impact.

Sensitivity of the receptors

14.12.3.7 The common receptors are considered to have high sensitivity to long-term habitat loss.

Significance of effect

14.12.3.8 Overall, the magnitude of the impact is deemed to be negligible for both the Offshore Project and OTW Project and the whole project assessment, and the sensitivity of the common receptors is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Disturbance and displacement

Magnitude of impact

14.12.3.9 During the operation and maintenance phase, great black-backed gull, herring gull, red-throated diver, fulmar and migratory waterbirds are impacted through disturbance and displacement from both the Offshore Project and OTW Project. Within this section, disturbance is seen as a temporary effect, whereby a species is disturbed for a short period of time, whereas displacement occurs over a longer period of time.

14.12.3.10 Within Section 14.9 there is no assessment of 'disturbance' specifically. However, red-throated diver is considered for 'distributional response (displacement)' and fulmar and migratory waterbirds are considered for 'barrier effects', both of which inherently include aspects of disturbance. Great black-backed gull and herring gull are not assessed for disturbance in Section 14.9 due to the absence of a predicted impact due to low to very low vulnerability to disturbance and displacement (Table 14.10) from the Offshore Project. However, given the potential effects from the OTW Project, it is assumed that disturbance will be addressed within the onshore ornithology assessment, consistent with previous cabling projects on the Isle of Lewis/*Eilean Leòdhais* (SSEN, 2025). Accordingly, these species have been included in this assessment to reflect the potential for overlapping effects between the Offshore Project and the OTW Project on the common receptors.

14.12.3.11 Following the inclusion of mitigation measures, the Marine and Nearshore Ornithology assessment concluded that the impact of the Offshore Project on fulmar and migratory waterbirds (assessed for barrier effects within Section 14.9.5) and red-throated diver (assessed for distributional responses within Section 14.9.3) was concluded to be of negligible magnitude resulting in a minor adverse significance, which is not significant in EIA terms.

14.12.3.12 The detailed designs of the OTW Project are not publicly available at the time of writing this assessment, therefore the extent over which disturbance will occur for the common receptors is

unknown. Great black-backed gull, herring gull, fulmar, red-throated diver and migratory waterbirds have been recorded breeding within the OTW Project Boundary and therefore there is potential that disturbance and displacement will occur.

14.12.3.13 As great black-backed gull and herring gull are not predicted to experience tangible disturbance or displacement effects from the Offshore Project, and any disturbance or displacement associated with the OTW Project is expected to be limited in spatial and temporal extent from the presence of work personnel visiting the TJBs within the OTW Project Boundary or working around the Landfall and/or Grid Substation, there is no realistic pathway for a significant combined effect on these species. Consequently, the overall impact on great black-backed gull and herring gull is expected to be of negligible magnitude.

14.12.3.14 It is assumed that standard mitigation measures will be implemented by the OTW Project which would apply the mitigation hierarchy to avoid harm, NatureScot's guidance on radial disturbance distances from any active nests and will ensure that the law will be followed concerning impacting breeding birds (e.g. no intentional harm to all species, or disturbance to Schedule 1 species). Therefore, it is anticipated that the magnitude of impact from the OTW project would also be negligible for red-throated diver, fulmar and migratory waterbirds.

14.12.3.15 Given both the Offshore Project and the OTW Project can conclude that the magnitude of impact is expected to be negligible, it is also considered that the whole project assessment can conclude a negligible magnitude of impact.

Sensitivity of the receptors

14.12.3.16 The common receptors are considered to have low to very high sensitivity to disturbance and displacement (Table 14.12).

Significance of effect

14.12.3.17 Overall, the magnitude of the impact is deemed to be negligible for both the Offshore Project and OTW Project and the whole project assessment, and the sensitivity of the common receptors is considered to be low to very high. The effect will, therefore, be of negligible to minor adverse significance, which is not significant in EIA terms.

14.12.4 DECOMMISSIONING

Temporary habitat loss and disturbance

Magnitude of impact

14.12.4.1 The predicted impacts during decommissioning are expected to be the same as, or less than, those identified for the construction phase for both the Offshore Project and the OTW Project. For the purpose of this assessment, it is therefore assumed that the combined level of temporary habitat

loss and disturbance arising during decommissioning will be similar to, or lower than, that experienced during construction. Any such effects are anticipated to be short-term and reversible, as birds are expected to return once decommissioning activities have ceased. Overall the impact is considered to be of negligible magnitude for both the Offshore Project and OTW Project and the whole project assessment.

Sensitivity of the receptors

14.12.4.2 The common receptors are considered to have low to high sensitivity to the temporary effects (see Table 14.20 and Table 14.21).

Significant of effect

14.12.4.3 Overall, the magnitude of the impact is deemed to be negligible for both the Offshore Project and OTW Project and the whole project assessment, and the sensitivity of the common receptors is considered to be low to high. The effect will, therefore, be of negligible to minor adverse significance, which is not significant in EIA terms.

14.13 ASSESSMENT OF CUMULATIVE EFFECTS

14.13.1 INTRODUCTION

14.13.1.1 For Marine and Nearshore Ornithology, a Zol has been applied to ensure direct and indirect cumulative effects can be appropriately identified and assessed. During the breeding season, the Zol has been set using a radial distance of 509 km from the Offshore Project site this is in line with the mean maximum foraging range of gannet (Woodward *et al*, 2019).

14.13.1.2 In line with MD-LOT's advice, the CEA initially considered a Zol of 2,365.5 km, reflecting the mean-maximum foraging range of Manx shearwater. The assessment methodology accounted for all projects within the respective foraging range of each species under consideration. However, as Manx shearwater was not taken forward for the CEA, due to the negligible impact predicted during the project alone assessment, the final Zol was based on gannet, using a radial distance of 509 km.

14.13.1.3 For the migration and non-breeding periods, the Zol is defined by the BDMPS region in which the Offshore Project is located for all species except guillemot. NatureScot advises (NatureScot, 2023c) that the Zol for guillemot during the non-breeding period should be based on their breeding season foraging range. This approach has therefore been adopted as part of the CEA.

14.13.1.4 Where a project overlapped with a BDMPS boundary, or was directly adjacent to it, the assessment applied a precautionary approach, assuming that the project's impacts could extend into the relevant BDMPS region. For example, the West of Orkney project almost overlaps with the UK Western Waters plus Channel BDMPS boundary line for kittiwake and was therefore included in the kittiwake CEA.

14.13.1.5 By integrating both spatial and seasonal dimensions into the Zol definition, the assessment ensures that potential interactions between the Offshore Project and Marine and Nearshore Ornithology receptors are comprehensively evaluated across the full annual cycle.

14.13.1.6 A short list of 'other developments' (i.e. other plans and projects) that may interact with the Offshore Project ZOI during their construction, operation or decommissioning is presented in Appendix 5.3, Volume 1c. This list has been generated applying criteria set out in Chapter 5, Volume 1a and has been collated up to the finalisation of the EIA through desk-based study, consultation, and engagement.

14.13.1.7 Only those other developments in the short list that fall within the Marine and Nearshore Ornithology Zol have the potential to result in cumulative effects with the Offshore Project on Marine and Nearshore Ornithology. All other plans and projects falling outside the Marine and Nearshore Ornithology Zol are excluded from this assessment. The following types of plans and projects have the potential to result in cumulative effects on Marine and Nearshore Ornithology:

- Offshore cabling projects;
- OWFs;
- Onshore wind farms;
- Tidal energy.

14.13.1.8 A summary of the effects and conclusions presented for the CEA is presented in Section 14.15.

14.13.2 APPROACH

14.13.2.1 A CEA examines the combined impacts of the Offshore Project together with other developments (including the OTW Project), as well as the contribution of the Offshore Project to those impacts on the same single receptor. It also considers the interaction of impacts from individual environmental aspects within the Offshore Project itself on the same single receptor. The overall method followed in identifying and assessing potential cumulative effects is set out in Chapter 5, Volume 1a and Appendix 5.3, Volume 1c.

14.13.2.2 Each project or plan has been considered on a case-by-case basis for screening in or out of this chapter's assessment based upon data confidence (the availability and accuracy of quantitative information, and the confidence that the information is likely to reflect the project's consented design), impact-receptor pathways and the spatial/temporal scales involved. All projects screened out are detailed within Appendix 5.3, Volume 1c.

14.13.2.3 The OTW Project has been considered within this CEA. However, given the assumed mitigation and the conclusions drawn within Section 14.12 there are no material additional impacts resulting from the OTW Project.

14.13.2.4 In undertaking the CEA for the Offshore Project, guidance set out by the PINS and RenewableUK suggest that other developments that are deemed likely to go ahead or are going ahead (reasonably foreseeable) and for which sufficient information is available, should be taken forward for consideration alongside the Offshore Project. Therefore, a tiered approach has been adopted which provides a framework for placing relative weight upon the potential for each other development to be included in the CEA to ultimately be realised, based upon the project/plan's current stage of maturity and certainty in the project's parameters. The tiering structure used for screening and assessment of other developments is in accordance with both Planning Inspectorate's Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment (PINS, 2025) and Planning Inspectorate Advice Note Seventeen (Planning Inspectorate 2025) and further explained within Section 5.8.4 of Chapter 5, Volume 1a. The tiered approach which has been applied within the Offshore Project CEA employs the following tiers:

- Tier 1: Other developments which are operational, have consent or have submitted a planning application which provides quantitative information on the predicted impacts.
- Tier 2: Other developments which have submitted a planning application, but without full quantitative impacts (e.g. a scoping report has been submitted).
- Tier 3: Other developments which have not submitted a planning application but have some information in the public domain (e.g. a pre-application website).

14.13.2.5 Within this assessment only other developments within Tier 1 are taken through to the CEA due to having the available information and data, with impacts from Tier 2 and 3 other developments unable to be quantified. All short-listed other developments are presented in Table 14.47 and shown in Figure 14.2, Volume 2b.

14.13.2.6 The potential impacts that have been considered in the CEA (listed in Table 14.48) is a subset of those considered for the Offshore Project alone assessment. This is because some of the potential impacts identified and assessed for the Offshore Project alone assessment are localised and temporary in nature or have been assessed to have a negligible impact. It is considered therefore, that these potential impacts have limited or no potential to interact with similar changes associated with other plans or projects. Furthermore, there are no small-scale or local projects in the vicinity of the Offshore Project that may contribute cumulatively to habitat loss, artificial light, prey impacts, or barrier effects.

14.13.2.7 The following impacts have therefore been scoped out of the CEA:

- Temporary habitat loss and disturbance during the construction and decommissioning phases;
- Indirect effects through effects on prey species during the construction and decommissioning phases;
- Response to artificial lighting during the construction, O&M and decommissioning phases;
- Barrier effects during the O&M phase;

- Long-term habitat loss (i.e. operational duration of the project) during the O&M phase.

14.13.2.8 Similarly, some of the potential impacts considered within the Offshore Project alone assessment are specific to a particular phase of development (e.g. construction, operations and maintenance, or decommissioning). Where cumulative effects with other plans or projects only have potential to occur where there is spatial or temporal overlap with Offshore Project during certain phases of development, this is taken into account in scoping. Impacts associated with a specific phase may be omitted from further consideration where no plans or projects have been identified that have the potential for cumulative effects during this period.

14.13.2.9 After applying all previously described CEA project screening criteria, including ZoI definition, species-specific foraging ranges or BDMPS, localised impact considerations and temporal overlap, a cumulative assessment is not required for a species where no other developments meet these criteria. As a result, fulmar, Manx shearwater, migratory birds, guillemot and great northern diver were not taken forward for within the CEA.

14.13.2.10 CEA of red-throated diver is undertaken differently to the Offshore Project alone assessment as the only other projects which could have a cumulative impact are onshore wind farms. The onshore wind farms undertake collision risk modelled for this species. The Offshore Project alone assessment only undertakes a distributional responses (displacement) impact assessment due to the low density of birds found with the Offshore Project Boundary. Therefore, to amalgamate the Offshore Project alone distributional responses (displacement) assessment with the collision risk assessments of the onshore wind farms, red-throated diver is considered under the impact collision and displacement combined during the O&M phase for the CEA.

14.13.2.11 The impacts and associated species to be considered in the CEA are therefore:

- Collision risk during the O&M phase:
 - kittiwake;
 - great black-backed gull;
 - herring gull;
 - Arctic tern;
 - gannet
- Distributional responses (displacement) associated with the Offshore Project during the O&M phase:
 - kittiwake;
 - razorbill;
 - puffin;
 - gannet.
- Collision and displacement combined during the O&M phase:
 - kittiwake;

- red-throated diver;
- gannet.

14.13.2.12 Some of the other developments considered cumulatively only have potential to impact species during a specific season (e.g. breeding or non-breeding seasons). During the breeding season, other developments within a species' foraging range were considered as there is the potential for individuals to have connectivity with Offshore Project and the other plans/projects specific to each species. Foraging ranges are presented in Section 14.6, selected based on Woodward *et al.* (2019). Within the non-breeding season all developments within the BDMPS area relevant to a species (Furness, 2015) are included.

14.13.2.13 For impacts assessed for the Offshore Project alone assessment (Section 14.9), annual impacts were calculated against the largest BDMPS population that could interact with the Offshore Project. This population, which occurs during the non-breeding season for each species, is also used in the cumulative assessment. While including additional projects may increase the number of birds affected beyond the Offshore Project's ZoI, the reference population remains the same.

14.13.2.14 As agreed with NatureScot and MD-LOT (via email 8 July 2025 and 16 April 2025, respectively, see Appendix 14.6, Volume 2c), for projects that have received consent, where such consent is subject to derogation and associated compensation requirements (e.g. because the Scottish Ministers' Appropriate Assessment concluded there would be an Adverse Effect On Integrity (AEOI), or an AEOI could not be ruled out, to a feature of an SPA), those compensated-for impacts have been removed from the cumulative totals where compensation measures are considered secured. "Secured" refers to situations where Scottish Ministers have either accepted the derogation plan and/or confirmed that compensation will be required. This is treated as secured for the purposes of the CEA. Where compensation requirements have been agreed, these are accounted for as a reduction in overall impacts rather than excluding the project entirely.

14.13.2.15 The Applicant is aware of 4 projects at the time of application which have received consent and required a derogation case, these are Berwick Bank, Green Volt, Salamander and West of Orkney. The number of birds which each of these projects is required to compensate for is taken from the Appropriate Assessment undertaken by Marine Scotland. NatureScot guidance recommends assessing a range of potential impacts, and the Scottish Ministers' Appropriate Assessment has provided the same range of impact figures requiring compensation. It is the Applicant's understanding that compensation has to be based on the worst-case scenario which corresponds to NatureScot's upper values, as presented in Scottish Minister's Appropriate Assessment. Therefore, as the Scottish Ministers' Appropriate Assessments have been used to determine the required amount of birds to be compensated for a consented project, when assessing the lower level of NatureScot's displacement assessment, there is a surplus, whereby the required number of birds to be compensated is larger than the predicted impact. The Applicant has not adjusted this,

as the impacts presented within the Scottish Ministers' Appropriate Assessments are deemed to be the minimum level of compensation, and therefore a surplus (net benefit) could exist.

- 14.13.2.16 As NatureScot's assessment range reflects uncertainty in the level of impact, it is consistent with the precautionary principle set out within the Habitats Regulations that compensatory requirements be based on the upper end of this range. If the true impact is less than this, which is consistent with NatureScot's range representing uncertainty in impact levels, then these compensatory requirements would be expected to lead to a population benefit.
- 14.13.2.17 At the request of MD-LOT and NatureScot, scenarios are also presented with and without Berwick Bank. The with and without Berwick Bank scenarios are only presented in the EIA for gannet, as this is the only species for which Berwick Bank is considered to have cumulative effects connectivity within the EIA assessment. The "with Berwick Bank" scenario assumes Berwick Bank proceeds and delivers compensation, following the approach set out above. The "without Berwick Bank" scenario assumes Berwick Bank does not go ahead, and so has no impact but also does not deliver any compensation. It should be noted that Berwick Bank received consent in July 2025 but is still presented as requested.
- 14.13.2.18 Following on from the CEA screening, 110 'other developments' have been identified from the original long-list presented within Appendix 5.3, Volume 1c. The 110 'other developments' forming the CEA short-list are presented in Table 14.47.
- 14.13.2.19 Of the 110 short-listed 'other developments', 74 have quantitative information/data in the public domain to allow a CEA to be undertaken.
- 14.13.2.20 All other developments listed in Table 14.47 and included in the CEA have been considered for each species and each impact pathway, however for ease of reporting only the other developments which have provided quantified impacts on the VORs within the appropriate seasons are presented in the species-specific tables (Table 14.50 to Table 14.84). When the other development does not have connectivity within a specific season, this information is provided. When the other development does not have available data it is not presented within the species-specific CEA table. Quantitative information/data utilised within the assessment have been either taken from these developments publicly available documentation or from the North East and East Ornithology Group (NEEOG) database.
- 14.13.2.21 For red-throated diver, as noted earlier, impacts from onshore wind farms within foraging range were considered in the CEA. These onshore wind farms are relevant only to red-throated diver; although they appear in Table 14.47, they do not feature in any other species' CEA because there is no impact pathway for those species

Table 14.47 Developments considered as part of the Marine and Nearshore Ornithology CEA

| ID | Application reference / Description of development | Type of development | Dates of operation | Status | Distance to Array Area (KM) | Distance to OCAS (KM) | Confidence in assessments | Tier | Included in CEA (Y/N) | Rationale |
|---------|---|---------------------|--------------------|-----------------------|-----------------------------|-----------------------|---------------------------|------|-----------------------|---------------------------|
| ENG-001 | West Anglesey Demonstration Zone Tidal Energy Project | Tidal Energy | 2023 - ongoing | Operational | 571 | 572 | High | 1 | Y | Available data for CEA |
| ENG-002 | Holyhead Deep Tidal Energy Project | Tidal Energy | 2017 – 2049 | Operational | 573 | 574 | High | 1 | Y | Available data for CEA |
| ENG-003 | Òran na Mara Tidal Energy Project | Tidal Energy | Unknown | In Planning - scoping | 277 | 280 | Medium | 2 | N | No available data for CEA |
| ENG-004 | MeyGen Tidal Energy Project | Tidal Energy | 2017 – ongoing | Operational | 203 | 200 | High | 1 | N | No available data for CEA |
| ENG-005 | Westray South Tidal Energy Project | Tidal Energy | 2033 - 2058 | In Planning - scoping | 228 | 227 | Medium | 2 | N | No available data for CEA |
| ENG-006 | Fall of Warness Tidal Energy Project | Tidal Energy | 2019 - ongoing | Operational | 231 | 230 | High | 1 | N | No available data for CEA |
| ENG-007 | Shapinsay Sound Tidal Energy Project | Tidal Energy | 2011 - ongoing | Operational | 223 | 222 | High | 1 | N | No available data for CEA |
| ENG-008 | Shetland Tidal Energy Project | Tidal Energy | 2023 - ongoing | Operational | 405 | 405 | High | 1 | N | No available data for CEA |
| ENG-009 | Billia Croo Wave Test Site | Tidal Energy | 2003 - 2040 | Operational | 194 | 192 | High | 1 | N | No available data for CEA |
| ENG-011 | Flex Marine Power, Sound Islay | Tidal Energy | 2024 - 2029 | Operational | 283 | 286 | High | 1 | N | No available data for CEA |

| ID | Application reference / Description of development | Type of development | Dates of operation | Status | Distance to Array Area (KM) | Distance to OCAS (KM) | Confidence in assessments | Tier | Included in CEA (Y/N) | Rationale |
|---------|--|---------------------|--------------------|---------------------------|-----------------------------|-----------------------|---------------------------|------|-----------------------|---------------------------|
| ENG-024 | Buchan Oil Field Electrification Development | Cable | Unknown | Pre Planning | 307 | 301 | Low | 3 | N | No available data for CEA |
| ENG-025 | Spittal to Peterhead Subsea Cable link | Cable | 2029 – ongoing | In Planning - application | 202 | 198 | High | 1 | N | No available data for CEA |
| ENG-026 | Eastern Green Link 2 | Cable | 2029 – ongoing | Under Construction | 304 | 298 | High | 1 | N | No available data for CEA |
| ENG-027 | Eastern Green Link 3 | Cable | 2034 – ongoing | In Planning - scoping | 329 | 321 | Medium | 2 | N | No available data for CEA |
| ENG-028 | Eastern Green Link 4 | Cable | 2034 - ongoing | In Planning - scoping | 322 | 321 | Medium | 2 | N | No available data for CEA |
| ENG-029 | Western Isles Connection Project - HVDC Link | Cable | 2030 – ongoing | In Planning - Application | 31 | 23 | High | 1 | Y | Available data for CEA |
| ENG-030 | Orkney - Mainland HVAC 220kV Subsea Link | Cable | 2028 - ongoing | Under Construction | 166 | 163 | High | 1 | Y | Available data for CEA |
| OWF-001 | Robin Rigg East | Offshore Wind Farm | 2010 – 2035 | Operational | 441 | 437 | High | 1 | Y | Available data for CEA |
| OWF-002 | Robin Rigg West | Offshore Wind Farm | 2010 – 2035 | Operational | 441 | 438 | High | 1 | Y | Available data for CEA |
| OWF-003 | Methil Demonstration | Offshore Wind Farm | 2013 -2038 | Operational | 332 | 324 | High | 1 | Y | Available data for CEA |

| ID | Application reference / Description of development | Type of development | Dates of operation | Status | Distance to Array Area (KM) | Distance to OCAS (KM) | Confidence in assessments | Tier | Included in CEA (Y/N) | Rationale |
|---------|--|---------------------|--------------------|---------------------------|-----------------------------|-----------------------|---------------------------|------|-----------------------|---------------------------|
| OWF-004 | Forthwind | Offshore Wind Farm | 2028 - 2053 | Consented | 333 | 326 | High | 1 | Y | Available data for CEA |
| OWF-005 | Beatrice Offshore Wind Farm | Offshore Wind Farm | 2019 - 2044 | Operational | 212 | 207 | High | 1 | Y | Available data for CEA |
| OWF-006 | Aberdeen Offshore Wind Farm | Offshore Wind Farm | 2018 - 2043 | Operational | 303 | 297 | High | 1 | Y | Available data for CEA |
| OWF-007 | Buchan Deep Demo | Offshore Wind Farm | 2017 - 2038 | Operational | 326 | 320 | High | 1 | Y | Available data for CEA |
| OWF-008 | Pentland Floating Offshore Wind Farm | Offshore Wind Farm | 2026 – 2056 | Consented | 159 | 156 | High | 1 | Y | Available data for CEA |
| OWF-009 | Berwick Bank Wind Farm | Offshore Wind Farm | 2033 - 2068 | Consented | 370 | 363 | High | 1 | Y | Available data for CEA |
| OWF-010 | Kincardine | Offshore Wind Farm | 2021 – 2046 | Operational | 323 | 316 | High | 1 | Y | Available data for CEA |
| OWF-011 | Moray Offshore Windfarm (East) | Offshore Wind Farm | 2022 - 2052 | Operational | 220 | 215 | High | 1 | Y | Available data for CEA |
| OWF-013 | Near na Gaoithe Offshore Wind Farm | Offshore Wind Farm | 2025 – 2050 | Operational | 350 | 342 | High | 1 | Y | Available data for CEA |
| OWF-014 | Bowdun Offshore Wind Farm | Offshore Wind Farm | 2034 – 2069 | In Planning - scoping | 346 | 340 | Medium | 2 | N | No available data for CEA |
| OWF-015 | Ossian Offshore Wind Farm | Offshore Wind Farm | 2038 – 2073 | In Planning - Application | 387 | 380 | High | 1 | Y | Available data for CEA |
| OWF-016 | Buchan Offshore Wind Farm | Offshore Wind Farm | 2034 – 2069 | In Planning - Application | 307 | 303 | High | 1 | Y | Available data for CEA |

| ID | Application reference / Description of development | Type of development | Dates of operation | Status | Distance to Array Area (KM) | Distance to OCAS (KM) | Confidence in assessments | Tier | Included in CEA (Y/N) | Rationale |
|---------|--|---------------------|--------------------|---------------------------|-----------------------------|-----------------------|---------------------------|------|-----------------------|---------------------------|
| OWF-017 | Stromar | Offshore Wind Farm | 2037 – 2062 | In Planning - scoping | 251 | 248 | Medium | 2 | N | No available data for CEA |
| OWF-018 | Broadshore | Offshore Wind Farm | 2034 – 2059 | In Planning - scoping | 277 | 273 | Medium | 2 | N | No available data for CEA |
| OWF-019 | Bellrock | Offshore Wind Farm | 2032 – 2057 | In Planning - scoping | 421 | 415 | Medium | 2 | N | No available data for CEA |
| OWF-020 | MarramWind | Offshore Wind Farm | 2036 – 2080 | In Planning - scoping | 338 | 333 | Medium | 2 | N | No available data for CEA |
| OWF-021 | MachairWind | Offshore Wind Farm | Unknown | In Planning - scoping | 240 | 245 | Medium | 2 | N | No available data for CEA |
| OWF-022 | CampionWind | Offshore Wind Farm | 2040 – 3000 | In Planning - scoping | 394 | 388 | Medium | 2 | N | No available data for CEA |
| OWF-023 | Ayre Offshore Wind Farm | Offshore Wind Farm | 2034 – 2069 | In Planning - scoping | 248 | 246 | Medium | 2 | N | No available data for CEA |
| OWF-024 | Talisk Offshore Wind Project | Offshore Wind Farm | 2032 – 2077 | In Planning - scoping | 28 | 32 | Medium | 2 | N | No available data for CEA |
| OWF-025 | Muir Mhor | Offshore Wind Farm | 2034 – 2079 | In Planning - Application | 364 | 359 | High | 1 | Y | Available data for CEA |
| OWF-026 | Havbredey | Offshore Wind Farm | 2035 – 2060 | In Planning - scoping | 55 | 55 | Medium | 2 | N | No available data for CEA |
| OWF-027 | West of Orkney Wind Farm | Offshore Wind Farm | 2029 – 2059 | Consented | 128 | 126 | High | 1 | Y | Available data for CEA |
| OWF-028 | Caledonia Offshore Wind Farm | Offshore Wind Farm | 2030 – 2065 | Consented | 228 | 224 | High | 1 | Y | Available data for CEA |

| ID | Application reference / Description of development | Type of development | Dates of operation | Status | Distance to Array Area (KM) | Distance to OCAS (KM) | Confidence in assessments | Tier | Included in CEA (Y/N) | Rationale |
|---------|--|---------------------|--------------------|---------------------------|-----------------------------|-----------------------|---------------------------|------|-----------------------|---------------------------|
| OWF-029 | Stoura Offshore Wind Farm | Offshore Wind Farm | 2035 – 2070 | In Planning - scoping | 428 | 428 | Medium | 2 | N | No available data for CEA |
| OWF-030 | Arven South | Offshore Wind Farm | 2034 – 2059 | In Planning - scoping | 392 | 392 | Medium | 2 | N | No available data for CEA |
| OWF-031 | Moray West | Offshore Wind Farm | 2025 – 2050 | Under Construction | 203 | 198 | High | 1 | Y | Available data for CEA |
| OWF-032 | Morven | Offshore Wind Farm | 2035 – 2060 | In Planning - scoping | 370 | 364 | Medium | 2 | N | No available data for CEA |
| OWF-033 | Arven Offshore Wind Farm | Offshore Wind Farm | 2034 - 2059 | In Planning - scoping | 409 | 409 | Medium | 2 | N | No available data for CEA |
| OWF-034 | Sinclair | Offshore Wind Farm | 2034 – 2059 | In Planning - scoping | 282 | 278 | Medium | 2 | N | No available data for CEA |
| OWF-035 | Scaraben | Offshore Wind Farm | 2034 – 2059 | In Planning - scoping | 288 | 283 | Medium | 2 | N | No available data for CEA |
| OWF-036 | Flora | Offshore Wind Farm | Unknown | Pre Planning | 335 | 330 | Low | 3 | N | No available data for CEA |
| OWF-037 | Malin | Offshore Wind Farm | Unknown | Pre Planning | 318 | 324 | Low | 3 | N | No available data for CEA |
| OWF-038 | Salamander | Offshore Wind Farm | 2030 – 2064 | Consented | 328 | 322 | High | 1 | Y | Available data for CEA |
| OWF-039 | Judy | Offshore Wind Farm | Unknown | Pre Planning | 566 | 561 | Low | 3 | N | No available data for CEA |
| OWF-040 | Cenos | Offshore Wind Farm | 2035 – 2070 | In Planning - Application | 491 | 486 | High | 1 | Y | Available data for CEA |

| ID | Application reference / Description of development | Type of development | Dates of operation | Status | Distance to Array Area (KM) | Distance to OCAS (KM) | Confidence in assessments | Tier | Included in CEA (Y/N) | Rationale |
|---------|--|---------------------|--------------------|--------------------|-----------------------------|-----------------------|---------------------------|------|-----------------------|---------------------------|
| OWF-041 | Cedar | Offshore Wind Farm | Unknown | Pre Planning | 451 | 446 | Low | 3 | N | No available data for CEA |
| OWF-042 | Beech | Offshore Wind Farm | Unknown | Pre Planning | 483 | 479 | Low | 3 | N | No available data for CEA |
| OWF-043 | Aspen | Offshore Wind Farm | 2031 – 2066 | Pre Planning | 371 | 366 | High | 1 | N | No available data for CEA |
| OWF-044 | Green Volt | Offshore Wind Farm | 2028 – 2063 | Consented | 348 | 343 | High | 1 | Y | Available data for CEA |
| OWF-045 | Seagreen Phase 1 Windfarm | Offshore Wind Farm | 2023 – 2058 | Operational | 342 | 335 | High | 1 | Y | Available data for CEA |
| OWF-046 | Seagreen 1A Offshore Wind Farm | Offshore Wind Farm | 2031 – 2056 | Consented | 341 | 334 | High | 1 | Y | Available data for CEA |
| OWF-047 | Inch Cape Offshore Wind Farm | Offshore Wind Farm | 2027 – 2052 | Under Construction | 333 | 326 | High | 1 | Y | Available data for CEA |
| OWF-048 | Culzean | Offshore Wind Farm | 2027 – 2052 | Consented | 522 | 517 | High | 1 | N | No available data for CEA |
| OWF-051 | Nomadic Offshore Wind | Offshore Wind Farm | Unknown | Pre Planning | 306 | 311 | Low | 3 | N | No available data for CEA |
| OWF-052 | North Channel Wind 1 | Offshore Wind Farm | Unknown | Pre Planning | 363 | 365 | Low | 2 | N | No available data for CEA |
| OWF-053 | North Channel Wind 2 | Offshore Wind Farm | Unknown | Pre Planning | 404 | 405 | Low | 2 | N | No available data for CEA |
| OWF-054 | Morgan | Offshore Wind Farm | 2030 – 2055 | Consented | 502 | 500 | High | 1 | Y | Available data for CEA |

| ID | Application reference / Description of development | Type of development | Dates of operation | Status | Distance to Array Area (KM) | Distance to OCAS (KM) | Confidence in assessments | Tier | Included in CEA (Y/N) | Rationale |
|---------|--|---------------------|--------------------|---------------------------|-----------------------------|-----------------------|---------------------------|------|-----------------------|------------------------|
| OWF-055 | Walney Extension | Offshore Wind Farm | 2018 – 2038 | Operational | 501 | 499 | High | 1 | Y | Available data for CEA |
| OWF-056 | Walney 1 & 2 | Offshore Wind Farm | 2012 – 2037 | Operational | 509 | 506 | High | 1 | Y | Available data for CEA |
| OWF-057 | Ormonde | Offshore Wind Farm | 2014 – 2035 | Operational | 516 | 513 | High | 1 | Y | Available data for CEA |
| OWF-058 | Barrow | Offshore Wind Farm | 2006 – 2031 | Operational | 529 | 526 | High | 1 | Y | Available data for CEA |
| OWF-059 | West of Duddon Sands | Offshore Wind Farm | 2014 – 2035 | Operational | 524 | 521 | High | 1 | Y | Available data for CEA |
| OWF-060 | Morecambe | Offshore Wind Farm | 2030 – 2065 | In Planning - Application | 536 | 534 | High | 1 | Y | Available data for CEA |
| OWF-061 | Mona | Offshore Wind Farm | 2030 – 2080 | Consented | 518 | 517 | High | 1 | Y | Available data for CEA |
| OWF-062 | Burbo Bank | Offshore Wind Farm | 2007 – 2032 | Operational | 584 | 581 | High | 1 | Y | Available data for CEA |
| OWF-063 | Burbo Bank Extension | Offshore Wind Farm | 2017 – 2042 | Operational | 580 | 578 | High | 1 | Y | Available data for CEA |
| OWF-077 | Rampion | Offshore Wind Farm | 2017 – 2024 | Operational | 950 | 945 | High | 1 | Y | Available data for CEA |
| OWF-087 | TwinHub (Wave Hub Floating Wind Farm) | Offshore Wind Farm | 2010 – 2035 | Operational | 888 | 892 | High | 1 | Y | Available data for CEA |
| OWF-088 | Awel y Mor | Offshore Wind Farm | 2030 – 2055 | Consented | 568 | 567 | High | 1 | Y | Available data for CEA |

| ID | Application reference / Description of development | Type of development | Dates of operation | Status | Distance to Array Area (KM) | Distance to OCAS (KM) | Confidence in assessments | Tier | Included in CEA (Y/N) | Rationale |
|---------|--|---------------------|--------------------|---------------------------|-----------------------------|-----------------------|---------------------------|------|-----------------------|---------------------------|
| OWF-116 | White Cross | Offshore Wind Farm | 2029 – 2054 | Consented | 809 | 805 | High | 1 | Y | Available data for CEA |
| OWF-117 | Portwind | Offshore Wind Farm | Unknown | Pre Planning | 905 | 906 | Low | 3 | N | No available data for CEA |
| OWF-118 | Rampion 2 | Offshore Wind Farm | 2030 – 2060 | Consented | 942 | 946 | High | 1 | Y | Available data for CEA |
| OWF-119 | Gwynt y Mor | Offshore Wind Farm | 2015 – 2040 | Operational | 574 | 576 | High | 1 | Y | Available data for CEA |
| OWF-120 | North Hoyle | Offshore Wind Farm | 2003 – 2034 | Operational | 584 | 586 | High | 1 | Y | Available data for CEA |
| OWF-121 | Rhyl Flats | Offshore Wind Farm | 2009 – 2039 | Operational | 583 | 585 | High | 1 | Y | Available data for CEA |
| OWF-122 | Erebus | Offshore Wind Farm | 2026 – 2051 | Consented | 769 | 765 | High | 1 | Y | Available data for CEA |
| OWF-123 | Llyr 1 | Offshore Wind Farm | 2028 – 2058 | Consented | 783 | 779 | High | 1 | Y | Available data for CEA |
| OWF-124 | Llyr 2 | Offshore Wind Farm | Unknown | Pre Planning | 785 | 781 | Low | 2 | N | No available data for CEA |
| OWF-125 | Oriel | Offshore Wind Farm | 2028 – 2068 | Consented | 494 | 490 | High | 1 | Y | Available data for CEA |
| OWF-127 | North Irish Sea Array | Offshore Wind Farm | 2029 – 2064 | In Planning - Application | 518 | 514 | High | 1 | Y | Available data for CEA |
| OWF-131 | Moor Vannin | Offshore Wind Farm | 2033 – 2068 | In Planning - Application | 477 | 479 | High | 1 | Y | Available data for CEA |

| ID | Application reference / Description of development | Type of development | Dates of operation | Status | Distance to Array Area (KM) | Distance to OCAS (KM) | Confidence in assessments | Tier | Included in CEA (Y/N) | Rationale |
|----------|--|---------------------|--------------------|-----------------------|-----------------------------|-----------------------|---------------------------|------|-----------------------|---------------------------|
| OWF-132 | Olympic wind | Offshore Wind Farm | Unknown | Pre Planning | 466 | 463 | Low | 3 | N | No available data for CEA |
| ONWF-002 | Stornoway Wind Farm | Onshore Wind Farm | 2031 – 2056 | Consented | 23 | 17 | High | 1 | Y | Available data for CEA |
| ONWF-003 | Beinn Ghrideag Wind Farm | Onshore Wind Farm | 2015 – 2040 | Operational | 25 | 19 | High | 1 | Y | Available data for CEA |
| ONWF-004 | Pentland Road Wind Farm | Onshore Wind Farm | 2013 – 2038 | Operational | 21 | 16 | High | 1 | Y | Available data for CEA |
| ONWF-005 | Druim Leathann Windfarm | Onshore Wind Farm | 2028 – 2053 | Consented | 24 | 17 | High | 1 | Y | Available data for CEA |
| ONWF-006 | Uisenis Wind Farm | Onshore Wind Farm | 2030 – 2055 | Consented | 31 | 34 | High | 1 | Y | Available data for CEA |
| ONWF-007 | Grimshader Wind Farm | Onshore Wind Farm | Unknown | In Planning - scoping | 28 | 23 | Medium | 2 | N | No available data for CEA |
| ONWF-008 | Heastabhal Wind Farm | Onshore Wind Farm | Unknown | In Planning - scoping | 27 | 31 | Medium | 2 | N | No available data for CEA |
| ONWF-009 | West Coast Community Energy Project | Onshore Wind Farm | Unknown | Pre-planning | 14 | 6 | Low | 3 | N | No available data for CEA |
| ONWF-010 | Tolsta Community Wind Farm | Onshore Wind Farm | 2013 – 2038 | Operational | 23 | 17 | High | 1 | Y | Available data for CEA |
| ONWF-011 | Arnish Moor Wind Farm | Onshore Wind Farm | 2006 – 2031 | Operational | 29 | 23 | High | 1 | Y | Available data for CEA |

| ID | Application reference / Description of development | Type of development | Dates of operation | Status | Distance to Array Area (KM) | Distance to OCAS (KM) | Confidence in assessments | Tier | Included in CEA (Y/N) | Rationale |
|----------|--|---------------------|--------------------|-------------|-----------------------------|-----------------------|---------------------------|------|-----------------------|------------------------|
| ONWF-012 | Monan Onshore Wind Farm | Onshore Wind Farm | 2010 – 2028 | Operational | 43 | 49 | High | 1 | Y | Available data for CEA |
| ONWF-013 | Baile an Truseil Wind Farm (Loch Sminig) | Onshore Wind Farm | 2015 – 2040 | Operational | 8 | 2 | High | 1 | Y | Available data for CEA |
| ONWF-014 | Loch Carnan Wind Farm | Onshore Wind Farm | 2013 – 2038 | Operational | 110 | 119 | High | 1 | Y | Available data for CEA |
| ONWF-015 | Horshader (Wind Turbine) | Onshore Wind Farm | Unknown | Operational | 7 | 8 | High | 1 | Y | Available data for CEA |
| ONWF-016 | Creed Business Park (Wind Turbine) | Onshore Wind Farm | Unknown | Operational | 28 | 21 | High | 1 | Y | Available data for CEA |
| ONWF-017 | Cearn an Ora Wind Farm (Monan Repowering) | Onshore Wind Farm | Unknown | Consented | 43 | 49 | High | 1 | Y | Available data for CEA |
| ONWF-019 | Bridge Cottages Wind Farm | Onshore Wind Farm | Unknown | Operational | 24 | 18 | High | 1 | Y | Available data for CEA |

14.13.3 MAXIMUM DESIGN SCENARIO

- 14.13.3.1 The MDS identified in Table 14.48 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative effects presented and assessed in this section are based on the subset of potential impacts carried forward from the Offshore Project alone assessment, where there is considered to be a realistic potential for cumulative interaction with other developments. Effects of greater adverse significance are not predicted to arise should any other development scenario (e.g. different turbine layout) for the Offshore Project, to that assessed here, be taken forward in the final design scheme. It should be noted that the projects of relevance to each species and associated seasons will not necessarily include all projects identified in Table 14.47. Projects considered for each species and associated season are identified in the species-specific assessment sections below.
- 14.13.3.2 Quantitative data utilised within the CEA have been taken from the North East and East Ornithology Group (NEEOG) database or if the project is not covered by the NEEOG dataset then publicly available documentation for these developments.

Table 14.48 MDS of the Marine and Nearshore Ornithology CEA

| Potential cumulative effect | Maximum Design Scenario | Justification |
|--|---|---|
| Collision Risk | The MDS of the Offshore Project (Table 14.18) alongside the other developments identified as being included in the CEA within Table 14.47 which overlap with O&M Phase of the Offshore Project with construction completed in 2032/2033 and a 35 year operation and maintenance phase | There is potential that the maximum impact will occur during the O&M Phase of the Offshore Project at the same time as the maximum impact from the identified other developments with connectivity. |
| Distributional responses (displacement) associated with the Offshore Project | | |

14.13.4 CUMULATIVE EFFECTS ASSESSMENT

14.13.4.1 As stated in paragraph 14.13.2.11, only collision, distributional responses (displacement) and combined collision and distributional responses (displacement) impacts during the O&M phases are screened into the CEA due to having comparable and quantified data from the other developments.

14.13.4.2 The other developments are presented alphabetically in the species-specific CEA tables.

Collision risk

Kittiwake

Magnitude

14.13.4.3 There are 26 other developments which contribute to the cumulative collision risk impact on the BDMPS populations of kittiwake which have connectivity with the Offshore Project.

14.13.4.4 The collision estimates have been updated when older projects used different avoidance rates to align with the latest NatureScot guidance (2025b).

14.13.4.5 The predicted cumulative number of kittiwake collision mortalities is 218.87 individuals in the breeding season, 251.53 individuals in the post-breeding season, 258.37 individuals in the pre-breeding season and 728.76 annually (Table 14.49) when not considering the removal of compensated birds.

14.13.4.6 As part of the West of Orkney project's consent from the Scottish Government compensation was required as part of a derogation case at 7 SPAs. The total compensated birds are removed from that project's total predicted seasonal impact within the bottom row of Table 14.49. MD-LOT and NatureScot confirmed (via email 8 July 2025 and 16 April 2025, respectively) that compensated birds can be excluded from assessment and therefore the Applicant will draw conclusions in respect to these numbers.

14.13.4.7 The predicted cumulative number of kittiwake collision mortalities is 215.55 individuals in the breeding season, 250.63 individuals in the post-breeding season, 256.79 individuals in the pre-breeding season and 722.96 annually (Table 14.49) when considering the removal of compensated birds. MD-LOT and NatureScot confirmed (via email 8 July 2025 and 16 April 2025, respectively) that compensated birds can be subtracted from the relevant impact totals and excluded from the assessment. The Applicant will therefore draw conclusions based on these adjusted numbers. The Offshore Project's contribution to these totals is relatively small particularly in the breeding season: 0.41% in the breeding season, 2.67% in the post-breeding season, 5.44% in the pre-breeding season, and 2.98% annually. This indicates that, while the project forms part of the cumulative impact, its individual contribution remains minor compared to the overall cumulative figures.

Table 14.49: Impact of predicted cumulative collision mortality estimates for kittiwake on seasonal and annual bases

| Project | Season | | | |
|---------------------------------------|------------------------|---------------|---------------|--------|
| | Breeding | Post-breeding | Pre-breeding | Annual |
| Awel y Mor | Outside foraging range | 7.89 | 15.09 | 22.99 |
| Beatrice Offshore Wind Farm | 70.11 | Outside BDMPS | Outside BDMPS | 70.11 |
| Burbo Bank | Outside foraging range | 0.74 | 0.73 | 1.47 |
| Burbo Bank Extension | Outside foraging range | 1.96 | 1.34 | 3.30 |
| Caledonia Offshore Wind Farm | 56.23 | Outside BDMPS | Outside BDMPS | 56.23 |
| Erebus | Outside foraging range | 23.60 | 12.33 | 35.94 |
| Gwynt y Mor | Outside foraging range | 11.80 | 11.69 | 23.49 |
| Llyr 1 | Outside foraging range | 20.94 | 3.03 | 23.97 |
| Mona | Outside foraging range | 8.29 | 15.87 | 24.16 |
| Moor Vannin | Outside foraging range | 16.53 | 25.63 | 42.16 |
| Moray East | 16.61 | Outside BDMPS | Outside BDMPS | 16.61 |
| Moray West | 53.08 | Outside BDMPS | Outside BDMPS | 53.08 |
| Morecambe | Outside foraging range | 8.62 | 3.99 | 12.61 |
| Morgan | Outside foraging range | 18.05 | 15.28 | 33.33 |
| Ormonde | Outside foraging range | 0.97 | 0.66 | 1.63 |
| Pentland | 4.87 | 0.73 | 0.00 | 5.60 |
| Rampion | Outside foraging range | 21.68 | 18.90 | 40.58 |
| Rampion 2 | Outside foraging range | 9.78 | 17.25 | 27.03 |
| Rhyl Flats | Outside foraging range | 1.16 | 1.18 | 2.34 |
| Robin Rigg | Outside foraging range | 1.39 | 1.27 | 2.66 |
| TwinHub (Wave Hub Floating Wind Farm) | Outside foraging range | 3.23 | 6.07 | 9.30 |
| Walney 1 & 2 | Outside foraging range | 2.84 | 3.52 | 6.36 |

| Project | Season | | | |
|---|------------------------|---------------|--------------|--------|
| | Breeding | Post-breeding | Pre-breeding | Annual |
| Walney Extension | Outside foraging range | 61.95 | 51.82 | 113.77 |
| West of Duddon Sands | Outside foraging range | 4.54 | 4.29 | 8.83 |
| West of Orkney | 17.08 | 16.31 | 21.87 | 55.26 |
| White Cross | Outside foraging range | 1.83 | 12.58 | 14.40 |
| Total collision mortalities | 217.98 | 244.84 | 244.40 | 707.21 |
| Offshore Project | 0.89 | 6.69 | 13.97 | 21.55 |
| Total collision mortalities (including the Offshore Project) | 218.87 | 251.53 | 258.37 | 728.76 |
| Total collision mortalities (including the Offshore Project) – West of Orkney compensated impacts removed | 215.55 | 250.63 | 256.79 | 722.96 |

14.13.4.8 In the breeding season, the baseline mortality rate is increased by 0.0972 percentage points. The baseline mortality rate increases by 0.0275 percentage points in the post-breeding and 0.0371 during the pre-breeding seasons. On an annual basis the increase in baseline mortality rate is 0.0793 percentage points (Table 14.50). During all seasons considered the increase in baseline mortality rate is >0.02 percentage points and therefore PVAs are required.

Table 14.50: Assessment of predicted cumulative collision mortality estimates for kittiwake on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Collision Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|---------------|---|------------------------------------|--|
| Breeding | 221,825 | 215.55 | 0.0972 |
| Post-breeding | 911,586 | 250.63 | 0.0275 |
| Pre-breeding | 691,526 | 256.79 | 0.0371 |
| Annual | 911,586 | 722.96 | 0.0793 |

14.13.4.9 As the increase in baseline mortality exceeded 0.02 percentage points increase during all seasons assessed PVAs are required, with the summary results presented in Table 14.51. Further information on the PVAs is presented in Appendix 14.5, Volume 2c. Within Appendix 14.5, Volume 2c, there is an explanation as to the robustness of PVA and all associated caveats. However, for clarity the 2 main caveats with PVAs are:

- Over-estimation of cumulative impacts. The PVA modelling does not account for changes in the predicted annual impacts due to the decommissioning of projects considered cumulatively. Over the lifetime of the Offshore Project the cumulative annual impact will reduce significantly when licences

for other developments expire and decommissioning occurs. The PVA metrics are therefore highly precautionary;

- No consideration has been made for density dependent compensation of demographic parameters within the modelled population, nor immigration, both of which could reduce the magnitude of any population change. PVA models within this assessment assumed density independence dynamics in line with NatureScot (2023f) guidance, meaning that survival and reproduction rates did not change with population size. In reality, seabird species exhibit density dependent regulation (Merrall *et al.* (2023)), where demographic rates (such as breeding success and juvenile survival) can improve when populations decline because competition for resources lessens. This compensatory effect can buffer against population reductions, making impacts less severe than predicted by density independent models. Excluding this mechanism can lead to results that do not reflect reality, as shown in Merrall *et al.* (2023), where ignoring density dependence resulted in biologically implausible growth projections or underestimated recovery times. Similarly, immigration can substantially influence viability, especially for seabird species in metapopulations or those with high dispersal ability (Nater, 2024). Immigration can offset local declines, increase genetic diversity, and reduce extinction risk, particularly when source populations remain healthy. Models that omit immigration assume closed populations, which rarely reflects ecological reality and can overstate vulnerability (Nater, 2024).

Table 14.51: Summary of cumulative PVA results for kittiwake collision impacts after 35 years

| Season/ Population | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-----------------------|---------------------------------------|----------------------------|---------------|---------------|---------------------------------|-------------------------------------|
| Breeding | 215.55 | 1.0017 | 0.9989 | 0.9593 | 0.11 | 4.07 |
| Post- breeding | 250.63 | 1.0020 | 0.9997 | 0.9884 | 0.03 | 1.16 |
| Pre- breeding | 256.79 | 1.0019 | 0.9996 | 0.9843 | 0.04 | 1.57 |
| Annual | 722.96 | 1.0014 | 0.9991 | 0.9667 | 0.09 | 3.33 |

14.13.4.10 The PVA results (Table 14.51) predicted a breeding season CPS value of 0.9593, indicating that the median population size after 35 years would be 4.07% smaller than the unimpacted population in the absence of any cumulative breeding season impacts. As outlined within Appendix 14.5, Volume 2c, the CGR is considered a more robust metric compared to the CPS in this analysis due to the models being conducted with density independence, in line with NatureScot (2023h) guidance. The model predicted a CGR value of 0.9989, meaning the growth rate of the impacted population under cumulative effects would be 0.11% lower than that of the unimpacted population.

14.13.4.11 Predicted impacts in the post-breeding and pre-breeding seasons were similarly small, with reductions in growth rate of $\leq 0.04\%$ and reductions in population size of $\leq 1.57\%$. The annual assessment also showed only minor changes, with a 0.09% reduction in growth rate and a 3.33% reduction in population size. Across all seasons, these levels of change are minimal and would likely

remain undetectable against natural population fluctuations and therefore would not adversely affect the population with a positive growth rate predicted. The population is predicted to increase under all the modelled parameters. Therefore, the magnitude of impact is considered to be negligible.

Sensitivity of VOR

14.13.4.12 As presented in paragraphs 14.9.2.15 to 14.9.2.18, kittiwake are deemed to be of high vulnerability (Table 14.15), low recoverability, and international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.13.4.13 Overall, the magnitude of the cumulative impact is deemed to be negligible for all seasons assessed and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Mitigation

14.13.4.14 No additional mitigation measures for kittiwake are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Great black-backed gull

Magnitude

14.13.4.15 There are 3 other developments which contribute to the cumulative collision risk impact on the BDMPS populations of great black-backed gull which have connectivity with the Offshore Project.

14.13.4.16 The collision estimates have been updated when older projects used different avoidance rates to align with the latest NatureScot guidance (2025b).

14.13.4.17 The predicted cumulative number of herring gull collision mortalities is zero individuals in the breeding season, 15.28 individuals in the non-breeding season and 15.28 annually (Table 14.52). The Offshore Project's contribution to these totals is low: 9.88% in the non-breeding season, and 9.88% annually. This indicates that, while the Offshore Project forms part of the cumulative impact, its individual contribution remains low compared to the overall cumulative figures.

Table 14.52: Impact of predicted cumulative collision mortality estimates for great black-back gull on seasonal and annual bases

| Project | Season | | |
|-----------------------------|------------------------|--------------|--------|
| | Breeding | Non-breeding | Annual |
| Pentland | Outside foraging range | 0 | 0 |
| Robin Rigg | Outside foraging range | 2.65 | 2.65 |
| West of Orkney | Outside foraging range | 11.13 | 11.13 |
| Total collision mortalities | 0 | 13.78 | 13.78 |
| Offshore Project | 0 | 1.51 | 1.51 |

| Project | Season | | |
|--|----------|--------------|--------|
| | Breeding | Non-breeding | Annual |
| Total collision mortalities (including the Offshore Project) | 0 | 15.28 | 15.28 |

14.13.4.18 In the non-breeding season, the baseline mortality rate is increased by 0.0445 percentage points. On an annual basis the increase in baseline mortality rate is 0.0445 percentage points (Table 14.53). During the non-breeding season and annually the increase in baseline mortality rate is >0.02 percentage points and therefore PVAs are required.

Table 14.53: Assessment of predicted cumulative collision mortality estimates for great black-backed gull on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Collision Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|--------------|---|------------------------------------|--|
| Breeding | 1,645 | 0 | 0 |
| Non-breeding | 34,380 | 15.28 | 0.0445 |
| Annual | 34,380 | 15.28 | 0.0445 |

14.13.4.19 As the increase in baseline mortality exceeded 0.02 percentage points increase during the non-breeding season and annually PVAs are required with the summary results presented in Table 14.54. Cumulative PVAs have been carried out for the scenarios. Further information on the PVAs is presented in Appendix 14.5, Volume 2c. Within Appendix 14.5, Volume 2c, there is an explanation as to the robustness of PVA and all associated caveats.

Table 14.54: Summary of cumulative PVA results for great black-backed gull collision impacts after 35 years

| Season/Population | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-------------------|------------------------------------|-------------------------|------------|------------|------------------------------|----------------------------------|
| Non-breeding | 15.28 | 1.1257 | 0.9995 | 0.9825 | 0.05 | 1.75 |
| Annual | 15.28 | 1.1257 | 0.9995 | 0.9825 | 0.05 | 1.75 |

14.13.4.20 The PVA results (Table 14.54) predicted a CPS value of 0.9825 for the non-breeding season, indicating that the median population size after 35 years would be 1.75% smaller than the unimpacted population in the absence of any cumulative non-breeding impact. The model predicted a non-breeding season CGR value of 0.9995, meaning the growth rate of the impacted population would be reduced by only 0.05% compared to the unimpacted population.

14.13.4.21 The annual assessment produced the same values, with a 0.05% reduction in growth rate and a 1.75% reduction in population size. These levels of change are minimal and would likely remain undetectable against natural population variability, indicating that the predicted impacts would not adversely affect the population.

14.13.4.22 The magnitude of impact is therefore considered to be negligible for the non-breeding season and annually.

Sensitivity of VOR

14.13.4.23 As presented in paragraphs 14.9.2.24 to 14.9.2.27, great black-backed gull are deemed to be of very high vulnerability (Table 14.15), low recoverability, and international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.13.4.24 Overall, the magnitude of the cumulative impact is deemed to be negligible for all seasons assessed and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Mitigation

14.13.4.25 No additional mitigation measures for great black-backed gull are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Herring gull

Magnitude

14.13.4.26 There are 17 other developments which contribute to the cumulative collision risk impact on the BDMPS populations of herring gull which have connectivity with the Offshore Project.

14.13.4.27 The collision estimates have been updated when older projects used different avoidance rates to align with the latest NatureScot guidance (2025b).

14.13.4.28 The predicted cumulative number of herring gull collision mortalities is zero individuals in the breeding season, 169.20 individuals in the non-breeding season and 169.20 annually (Table 14.55). The Offshore Project's contribution to these totals is very small: 0.98% in both the non-breeding season and annually. This indicates that, while the Offshore Project forms part of the cumulative impact, its individual contribution remains negligible compared to the overall cumulative figures.

Table 14.55: Impact of predicted cumulative collision mortality estimates for herring gull on seasonal and annual bases

| Project | Season | | |
|------------|------------------------|--------------|--------|
| | Breeding | Non-breeding | Annual |
| Awel y Mor | Outside foraging range | 1.66 | 1.66 |
| Burbo Bank | Outside foraging range | 1.93 | 1.93 |

| Project | Season | | |
|--|------------------------|--------------|--------|
| | Breeding | Non-breeding | Annual |
| Burbo Bank Extension | Outside foraging range | 16.59 | 16.59 |
| Erebus | Outside foraging range | 3.37 | 3.37 |
| Gwynt y Mor | Outside foraging range | 22.31 | 22.31 |
| Mona | Outside foraging range | 1.51 | 1.51 |
| Moor Vannin | Outside foraging range | 9.67 | 9.67 |
| Morecambe | Outside foraging range | 3.01 | 3.01 |
| Morgan | Outside foraging range | 9.41 | 9.41 |
| Ormonde | Outside foraging range | 0.42 | 0.42 |
| Rhyl Flats | Outside foraging range | 3.39 | 3.39 |
| Robin Rigg | Outside foraging range | 4.48 | 10.14 |
| Twinhub | Outside foraging range | 17.68 | 17.68 |
| Walney 1 & 2 | Outside foraging range | 14.29 | 14.29 |
| Walney Extension | Outside foraging range | 46.02 | 46.02 |
| West of Duddon Sands | Outside foraging range | 11.52 | 11.52 |
| White Cross | Outside foraging range | 0.30 | 0.30 |
| Total collision mortalities | 0 | 167.55 | 167.55 |
| Offshore Project | 0 | 1.65 | 1.65 |
| Total collision mortalities (including the Offshore Project) | 0 | 169.20 | 169.20 |

14.13.4.29 In the non-breeding season, the baseline mortality rate is increased by 0.0976 percentage points. On an annual basis the increase in baseline mortality rate is 0.0976 percentage points (Table 14.53). During the non-breeding season and annually the increase in baseline mortality rate is >0.02 percentage points and therefore PVAs are required.

Table 14.56: Assessment of predicted cumulative collision mortality estimates for herring gull on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Collision Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|--------------|---|------------------------------------|--|
| Breeding | 3,148 | 0 | 0.0000 |
| Non-breeding | 173,299 | 169.20 | 0.0976 |
| Annual | 173,299 | 169.20 | 0.0976 |

14.13.4.30 As the increase in baseline mortality exceeded 0.02 percentage points increase during the non-breeding season and annually cumulative PVAs are required with the summary results presented in Table 14.57. Further information on the PVAs is presented in Appendix 14.5, Volume 2c. Within Appendix 14.5, Volume 2c, there is an explanation as to the robustness of PVA and all associated caveats.

Table 14.57: Summary of cumulative PVA results for herring gull collision impacts after 35 years

| Season/ Population | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-----------------------|---------------------------------------|----------------------------|---------------|---------------|---------------------------------|-------------------------------------|
| Non- breeding | 169.20 | 0.9484 | 0.9989 | 0.9585 | 0.12 | 4.15 |
| Annual | 169.20 | 0.9484 | 0.9989 | 0.9585 | 0.12 | 4.15 |

14.13.4.31 These PVA results (Table 14.57) predicted a CPS value of 0.9585 for the non-breeding season and annually, indicating that the median population size after 35 years would be 4.15% smaller than the unimpacted population in the absence of any cumulative impact. The model also predicted a CGR value of 0.9989, meaning the growth rate of the impacted population would be reduced by only 0.12% compared with the unimpacted population.

14.13.4.32 These levels of change remain small and would likely remain undetectable against natural population variability, indicating that the predicted impacts would not adversely affect the population. The magnitude of impact is therefore considered to be low for the non-breeding season and annually.

Sensitivity of VOR

14.13.4.33 As presented in paragraphs 14.9.2.33 to 14.9.2.36, herring gull are deemed to be of very high vulnerability (Table 14.15), low recoverability, and local value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.13.4.34 Overall, the magnitude of the cumulative impact is deemed to be negligible for all seasons assessed and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor to moderate adverse significance. Given the marginal change in growth rate (only 0.12%) then this is considered of minor adverse significance, which is not significant in EIA terms.

Mitigation

14.13.4.35 No additional mitigation measures for great black-backed gull are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded measures outlined in Table 14.19) is not significant in EIA terms.

Arctic tern

Magnitude

14.13.4.36 There are 3 other developments which contribute to the cumulative collision risk impact on the BDMPS populations of Arctic tern which have connectivity with the Offshore Project.

14.13.4.37 The collision estimates have been updated when older projects used different avoidance rates to align with the latest NatureScot guidance (2025b).

14.13.4.38 The predicted cumulative number of Arctic tern collision mortalities is 1.75 individuals in the breeding season, 0.05 individuals in the post-breeding season, zero individuals in the pre-breeding season and 2.01 annually (Table 14.58).

Table 14.58: Impact of predicted cumulative collision mortality estimates for Arctic tern on seasonal and annual bases

| Other development | Season | | | |
|--|------------------------|--|--------------|--------|
| | Breeding | Post-breeding | Pre-breeding | Annual |
| Awel Y Mor | Outside foraging range | Seasonal breakdown not provided for this project | | 0.21 |
| Morecambe | Outside foraging range | 0.02 | 0 | 0.02 |
| White Cross | Outside foraging range | 0.03 | 0 | 0.03 |
| Total collision mortalities | 0 | 0.05 | 0 | 0.26 |
| Offshore Project | 1.75 | 0.00 | 0 | 1.75 |
| Total collision mortalities (including the Offshore Project) | 1.75 | 0.05 | 0 | 2.01 |

14.13.4.39 In the breeding season, the baseline mortality rate is increased by 0.0967 percentage points and therefore requires PVA to be undertaken. In the post-breeding season, the baseline mortality rate increases by 0.0001 percentage points, but there is no increase in baseline mortality in the pre-breeding seasons. On an annual basis the increase in baseline mortality rate is 0.0028 percentage points (Table 14.59).

Table 14.59: Assessment of predicted cumulative collision mortality estimates for Arctic tern on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Collision Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|---------------|---|------------------------------------|--|
| Breeding | 1,814 | 1.75 | 0.0967 |
| Post-breeding | 71,398 | 0.05 | 0.0001 |
| Pre-breeding | 71,398 | 0 | 0 |
| Annual | 71,398 | 2.01 | 0.0028 |

14.13.4.40 As the increase in baseline mortality exceeded 0.02 percentage points in the breeding season when considering the cumulative impact, PVA has been carried out for this scenario. Further information on the PVA is presented in Appendix 14.5, Volume 2c.

14.13.4.41 It should be noted that the CEA impact is the same as the Offshore Project alone impact during the breeding season, as no other projects have connectivity during that season. Therefore, the

magnitude is as presented in Table 14.27 of the Offshore Project alone assessment. As stated within paragraph 14.9.2.49, PVA results indicate that the population growth rate would be 0.15% lower than the counterfactual (unimpacted) growth rate, resulting in a population that is 5.41% smaller than the counterfactual after 35 years. This level of impact during the breeding season is considered negligible.

14.13.4.42 During the post-breeding, pre-breeding seasons and annually, the cumulative impact results in a less than 0.02 percentage point increase in the baseline mortality rate, which is likely be undetectable against background noise of natural variation. Therefore, the magnitude is considered negligible for all seasons considered.

Sensitivity of VOR

14.13.4.43 As presented in paragraphs 14.9.2.44 to 14.9.2.47, Arctic tern are deemed to be of medium vulnerability, low recoverability, and national conservation value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.13.4.44 Overall, the magnitude of the cumulative impact is deemed to be negligible for all seasons assessed and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Mitigation

14.13.4.45 No additional mitigation measures for Arctic tern are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded measures outlined in Table 14.19) is not significant in EIA terms.

Gannet

Magnitude

14.13.4.46 There are 39 other developments which contribute to the cumulative collision risk impact on the BDMPS populations of gannet which have connectivity with the Offshore Project.

14.13.4.47 The collision estimates have been updated when older projects used different avoidance rates to align with the latest NatureScot guidance (2025b).

14.13.4.48 At the request of MD-LOT and NatureScot scenarios are presented with and without Berwick Bank. However, Berwick Bank received consent in July 2025. To make interpretation of the results simpler, 4 scenarios are presented within the gannet CEA. The scenarios are as follows:

- Scenario 1 – With Berwick Bank and no compensated birds removed;
- Scenario 2 – Without Berwick Bank and no compensated birds removed;
- Scenario 3 – With Berwick Bank and compensated birds removed from Berwick Bank, West of Orkney, GreenVolt and Salamander;

- Scenario 4 – Without Berwick Bank and compensated birds removed from West of Orkney, GreenVolt and Salamander.

14.13.4.49 For scenario 1, the predicted cumulative number of gannet collision mortalities is 735.16 individuals in the breeding season, 30.12 individuals in the post-breeding season, 12.35 individuals in the pre-breeding season and 777.64 annually (Table 14.60).

14.13.4.50 For scenario 2, the predicted cumulative number of gannet collision mortalities is 625.43 individuals in the breeding season, 30.12 individuals in the post-breeding season, 12.35 individuals in the pre-breeding season and 667.91 annually (Table 14.60).

14.13.4.51 As part of the West of Orkney, Berwick Bank, GreenVolt and Salamander project's consent from the Scottish Government, compensation was required as part of a derogation case for multiple SPAs. West of Orkney required compensation for 3 SPAs, Berwick Bank required compensation for 2 SPAs, GreenVolt and Salamander required compensation for 1 SPA. The compensated birds are removed from the total predicted impact within the Table 14.60. MD-LOT and NatureScot confirmed (via email 8 July 2025 and 16 April 2025, respectively) that compensated birds can be excluded from assessment and therefore the Applicant will draw conclusions in respect to these scenarios (3 and 4) and does not present additional analysis for scenarios 1 and 2.

14.13.4.52 For scenario 3, the predicted cumulative number of gannet collision mortalities is 580.66 individuals in the breeding season, 27.38 individuals in the post-breeding season, 11.52 individuals in the pre-breeding season and 609.17 annually (Table 14.60). The predicted contribution of the Offshore Project to overall gannet mortality is minor, accounting for approximately 3.78% of the breeding season total.

14.13.4.53 For scenario 4, the predicted cumulative number of gannet collision mortalities is 620.13 individuals in the breeding season, 27.38 individuals in the post-breeding season, 11.52 individuals in the pre-breeding season and 614.56 annually (Table 14.60). The Offshore Project's contribution remains small across all seasons, representing 3.54% in the breeding season, 4.42% in the post-breeding season, 1.48% in the pre-breeding season, and 3.80% annually. The Offshore Project's predicted impact on gannet collisions is therefore minor compared to the overall cumulative figures.

Table 14.60: Impact of predicted cumulative collision mortality estimates for gannet on seasonal and annual bases

| Project | Season | | | |
|---------------------------------|----------|---------------|---------------|--------|
| | Breeding | Post-breeding | Pre-breeding | Annual |
| Aberdeen (EOWDC) | 2.94 | Outside BDMPS | Outside BDMPS | 2.94 |
| Awel y Mor | 7.57 | 1.61 | 0.09 | 9.27 |
| Beatrice Offshore Wind Farm | 26.18 | Outside BDMPS | Outside BDMPS | 26.18 |
| Berwick Bank Offshore Wind Farm | 109.73 | Outside BDMPS | Outside BDMPS | 109.73 |

| Project | Season | | | |
|--|------------------------|---------------|---------------|--------|
| | Breeding | Post-breeding | Pre-breeding | Annual |
| Buchan Offshore | 2.98 | Outside BDMPS | Outside BDMPS | 2.98 |
| Burbo Bank | Outside foraging range | 0.02 | 0.02 | 0.04 |
| Burbo Bank Extension | 12.06 | 0.05 | 0.04 | 12.16 |
| Caledonia Offshore Wind Farm | 12.35 | Outside BDMPS | Outside BDMPS | 12.35 |
| Cenos Floating Offshore Wind Farm | 17.15 | Outside BDMPS | Outside BDMPS | 17.15 |
| Erebus | Outside foraging range | 0.20 | 0.26 | 0.46 |
| Green Volt – Floating Offshore Wind Farm | 14.90 | Outside BDMPS | Outside BDMPS | 14.90 |
| Gwynt y Mor | Outside foraging range | 0.33 | 0.28 | 0.61 |
| Hywind Scotland Pilot Park | 3.92 | Outside BDMPS | Outside BDMPS | 3.92 |
| Inch Cape Offshore Wind Farm | 75.60 | Outside BDMPS | Outside BDMPS | 75.60 |
| Kincardine – Phase 1 & Phase 2 | 2.10 | Outside BDMPS | Outside BDMPS | 2.10 |
| Llyr 1 | Outside foraging range | 0.49 | 0.27 | 0.77 |
| Mona | Outside foraging range | 0.56 | 0.34 | 0.90 |
| Moor Vannin | 11.30 | 1.40 | 0.15 | 12.84 |
| Moray East | 56.42 | Outside BDMPS | Outside BDMPS | 56.42 |
| Moray West | 6.86 | Outside BDMPS | Outside BDMPS | 6.86 |
| Morecambe | Outside foraging range | 0.14 | 0.02 | 0.16 |
| Morgan | Outside foraging range | 0.31 | 0.15 | 0.46 |
| Muir Mhòr Floating Wind Farm | 9.73 | Outside BDMPS | Outside BDMPS | 9.73 |
| Nearr na Gaoithe Offshore Windfarm | 62.30 | Outside BDMPS | Outside BDMPS | 62.30 |
| North Irish Sea Array | 1.46 | Outside BDMPS | Outside BDMPS | 1.46 |
| Oriel | 4.60 | Outside BDMPS | Outside BDMPS | 4.60 |
| Ormonde | Outside foraging range | 2.75 | 0.51 | 3.26 |
| Ossian Floating Offshore Windfarm | 28.58 | Outside BDMPS | Outside BDMPS | 28.58 |
| Pentland | 1.40 | 0.70 | 0.00 | 2.10 |
| Rhyl Flats | Outside foraging range | 0.05 | 0.12 | 0.17 |
| Robin Rigg | 0.69 | 0.03 | 0.02 | 0.74 |
| Salamander | 6.50 | Outside BDMPS | Outside BDMPS | 6.50 |
| Seagreen Offshore Windfarm | 200.60 | Outside BDMPS | Outside BDMPS | 200.60 |
| Walney 1 & 2 | Outside foraging range | 0.09 | 0.07 | 0.15 |

| Project | Season | | | |
|--|------------------------|---------------|--------------|--------|
| | Breeding | Post-breeding | Pre-breeding | Annual |
| Walney Extension | Outside foraging range | 4.37 | 0.98 | 5.35 |
| West of Duddon Sands | Outside foraging range | 0.09 | 0.07 | 0.16 |
| West of Orkney | 35.30 | 4.62 | 1.55 | 41.47 |
| White Cross | Outside foraging range | 0.51 | 0.25 | 0.76 |
| TwinHub (Wave Hub Floating Wind Farm) | Outside foraging range | 10.59 | 7.00 | 17.59 |
| Total collision mortalities (with Berwick Bank) | 713.21 | 28.91 | 12.19 | 754.31 |
| Total collision mortalities (without Berwick Bank) | 603.49 | 28.91 | 12.19 | 644.58 |
| Offshore Project | 21.95 | 1.21 | 0.17 | 23.33 |
| Total collision mortalities (including the Offshore Project and Berwick Bank) – Scenario 1 | 735.16 | 30.12 | 12.35 | 777.64 |
| Total collision mortalities (including the Offshore Project but without Berwick Bank) – Scenario 2 | 625.43 | 30.12 | 12.35 | 667.91 |
| Total collision mortalities (including the Offshore Project and Berwick Bank) – compensated impacts from Berwick Bank, West of Orkney, GreenVolt and Salamander removed – Scenario 3 | 580.66 | 27.38 | 11.52 | 609.17 |
| Total collision mortalities (including the Offshore Project but without Berwick Bank) – compensated impacts from West of Orkney, GreenVolt and Salamander removed – Scenario 4 | 620.13 | 27.38 | 11.52 | 614.56 |

14.13.4.54 When considering scenario 3, during the breeding season, the baseline mortality rate is increased by 0.0630 percentage points. The baseline mortality rate increases by 0.0050 percentage points in the post-breeding and 0.0017 during the pre-breeding seasons. On an annual basis the increase in baseline mortality rate is 0.0661 percentage points (Table 14.61). During the breeding season and annually the increase in baseline mortality rate is >0.02 percentage points and therefore PVAs are required.

Table 14.61: Assessment of predicted cumulative collision mortality estimates for gannet on seasonal and annual bases against the baseline mortality of relevant regional populations (scenario 3 - with Berwick Bank)

| Season | Regional Baseline Population (No. of Birds) | Collision Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|---------------|--|---------------------------------------|---|
| Breeding | 922,238 | 580.66 | 0.0630 |
| Post-breeding | 545,954 | 27.38 | 0.0050 |
| Pre-breeding | 661,888 | 11.52 | 0.0017 |
| Annual | 922,238 | 609.17 | 0.0661 |

14.13.4.55 When considering scenario 4, during the breeding season, the baseline mortality rate is increased by 0.0672 percentage points. The baseline mortality rate increases by 0.0050 percentage points in the post-breeding and 0.0017 during the pre-breeding seasons. On an annual basis the increase in baseline mortality rate is 0.0666 percentage points (Table 14.62). During the breeding season and annually the increase in baseline mortality rate is >0.02 percentage points and therefore PVAs are required.

Table 14.62: Assessment of predicted cumulative collision mortality estimates for gannet on seasonal and annual bases against the baseline mortality of relevant regional populations (scenario 4 - without Berwick Bank)

| Season | Regional Baseline Population (No. of Birds) | Collision Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|---------------|--|---------------------------------------|---|
| Breeding | 922,238 | 620.13 | 0.0672 |
| Post-breeding | 545,954 | 27.38 | 0.0050 |
| Pre-breeding | 661,888 | 11.52 | 0.0017 |
| Annual | 922,238 | 614.56 | 0.0666 |

14.13.4.56 As the increase in baseline mortality exceeded 0.02 percentage points increase during the breeding season and annually PVAs are required with the summary results presented in Table 14.63. Further information on the PVAs is presented in Appendix 14.5, Volume 2c.

Table 14.63: Summary of cumulative PVA results for gannet collision impacts after 35 years

| Season/ Population | Scenario | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-----------------------|-----------------------------|--|----------------------------|---------------|---------------|---------------------------------|--|
| Breeding | 3 – with Berwick Bank | 580.66 | 1.0116 | 0.9993 | 0.9734 | 0.07 | 2.66 |
| Breeding | 4 – without Berwick Bank | 620.13 | 1.0116 | 0.9992 | 0.9716 | 0.08 | 2.84 |
| Annual | 3 – with Berwick Bank | 609.17 | 1.0116 | 0.9992 | 0.9721 | 0.08 | 2.79 |
| Annual) | 4 – without Berwick Bank | 614.56 | 1.0116 | 0.9992 | 0.9719 | 0.08 | 2.81 |

14.13.4.57 These PVA results (Table 14.63) predicted CPS values of 0.9734 and 0.9716 for the breeding season under scenario 3 and 4, respectively, indicating that the median population size after 35 years would be 2.66 to 2.84% smaller than the unimpacted population in the absence of any cumulative breeding-season impacts. The model predicted corresponding CGR values of 0.9993 and 0.9992, meaning the growth rate of the impacted population would be reduced by only 0.07 to 0.08% compared with the unimpacted population.

14.13.4.58 The annual assessment showed similar results, with CPS values of 0.9721 and 0.9719, and CGR values of 0.9992 for both scenario 3 and 4, corresponding to reductions in growth rate of 0.08% and population size of 2.79 to 2.81%. These levels of change are small and would likely remain undetectable against natural population variability, indicating that the predicted impacts would not adversely affect the population.

14.13.4.59 The magnitude of impact is therefore considered to be negligible under all scenarios for the breeding season and annually.

Sensitivity of VOR

14.13.4.60 As presented in paragraphs 14.9.2.64 to 14.9.2.67, gannet are deemed to be of high vulnerability (Table 14.15), medium recoverability, and international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.13.4.61 Overall, the magnitude of the cumulative impact is deemed to be negligible for all seasons assessed and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Mitigation

14.13.4.62 No additional mitigation measures for gannet are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded measures outlined in Table 14.19) is not significant in EIA terms.

Distributional responses (displacement) associated with the Offshore Project

Kittiwake

Magnitude

14.13.4.63 There are 26 other developments which contribute to the cumulative displacement impact on the BDMPs populations of kittiwake which have connectivity with the Offshore Project.

14.13.4.64 The cumulative total number of kittiwake susceptible to displacement 14,026 individuals in the breeding season, 10,731 individuals in the post-breeding season, 7,335 individuals in the pre-breeding season and 32,092 annually (Table 14.64). The Offshore Project's contribution to these totals is relatively small, particularly in the breeding season: 0.24% in the breeding season, 2.02% in the post-breeding season, 9.00% in the pre-breeding season, and 2.84% annually. This shows that,

while the project is part of the cumulative impact, its individual contribution remains minor compared to the overall cumulative displacement.

Table 14.64: Seasonal population estimates of kittiwake for the other developments considered in the CEA

| Project | Season | | | |
|------------------------------|------------------------|---------------|---------------|--------|
| | Breeding | Post-breeding | Pre-breeding | Annual |
| Awel y Mor | Outside foraging range | 180 | 420 | 600 |
| Beatrice Offshore Wind Farm | 1,430 | Outside BDMPS | Outside BDMPS | 1,430 |
| Burbo Bank | Outside foraging range | 20 | 22 | 42 |
| Burbo Bank Extension | Outside foraging range | 98 | 50 | 148 |
| Caledonia Offshore Wind Farm | 2,039 | Outside BDMPS | Outside BDMPS | 2,039 |
| Erebus | Outside foraging range | 2,022 | 508 | 2,530 |
| Gwynt y Mor | Outside foraging range | 65 | 72 | 137 |
| Llyr 1 | Outside foraging range | 1,944 | 206 | 2,150 |
| Mona | Outside foraging range | 560 | 574 | 1134 |
| Moor Vaninn | Outside foraging range | 521 | 992 | 1513 |
| Moray East | 1,963 | Outside BDMPS | Outside BDMPS | 1,963 |
| Moray West | 6,902 | Outside BDMPS | Outside BDMPS | 6,902 |
| Morecambe | Outside foraging range | 1,717 | 324 | 2,041 |
| Morgan | Outside foraging range | 1,151 | 791 | 1,941 |
| Ormonde | Outside foraging range | 20 | 22 | 42 |
| Pentland | 546 | 118 | 41 | 705 |
| Rampion | Outside foraging range | 172 | 151 | 323 |
| Rampion 2 | Outside foraging range | 97 | 286 | 383 |
| Rhyl Flats | Outside foraging range | 20 | 22 | 42 |
| Robin Rigg | Outside foraging range | 28 | 30 | 58 |

| Project | Season | | | |
|--|---------------------------|---------------|--------------|--------|
| | Breeding | Post-breeding | Pre-breeding | Annual |
| TwinHub (Wave Hub Floating Wind Farm) | Outside foraging range | 106 | 18 | 124 |
| Walney 1 & 2 | Outside foraging range | 86 | 94 | 180 |
| Walney Extension | Outside foraging range | 645 | 336 | 981 |
| West of Duddon Sands | Outside foraging range | 62 | 68 | 130 |
| West of Orkney | 1,113 | 799 | 1,217 | 3,129 |
| White Cross | Outside foraging range | 83 | 432 | 515 |
| Total abundance | 13,993 | 10,514 | 6,675 | 31,182 |
| Offshore Project | 33 | 217 | 660 | 910 |
| Total abundance (including the Offshore Project) | 14,026 | 10,731 | 7,335 | 32,092 |

14.13.4.65 As part of the West of Orkney project's consent from the Scottish Government compensation was required as part of a derogation case at 7 SPAs. The compensated birds are removed from the predicted seasonal impacts within Table 14.65. MD-LOT and NatureScot confirmed (via email 8 July 2025 and 16 April 2025, respectively) that compensated birds can be excluded from assessment and therefore the Applicant will draw conclusions in respect to these numbers.

14.13.4.66 For kittiwake in the breeding season and annually the estimated percentage point increase in baseline mortality remains below the 0.02 percentage point increase threshold when considering the Applicant Approach (30% displacement and 1% mortality year-round) and the lower scenario of the NatureScot Approach (30% displacement and 1% mortality). However, under the upper scenario of the NatureScot Approach (60% displacement and 3% mortality), the increase in baseline mortality exceeds 0.02 percentage points.

14.13.4.67 For the pre- and post-breeding seasons, the estimated percentage point increase in baseline mortality remains below the 0.02 percentage point increase threshold. This conclusion is applicable when modelling using the parameters advocated for by both NatureScot and the Applicant, both of which are included in Table 14.65. Therefore, the magnitude of impact during these two seasons under both the NatureScot and the Applicant Approach is considered to be negligible.

Table 14.65: CEA of predicted displacement mortality estimates for kittiwake on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Displacement Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|--|---|---------------------------------------|--|
| NatureScot (30% displacement; 1-3% mortality) | | | |
| Breeding | 221,825 | 40.23-124.38 | 0.0181-0.0561 |
| Post-breeding | 911,586 | 31.81-96.20 | 0.0035-0.0106 |
| Pre-breeding | 691,526 | 21.20-65.21 | 0.0031-0.0094 |
| Annual | 911,586 | 93.24-285.79 | 0.0102-0.0314 |
| Applicant (30% displacement; 1% mortality) | | | |
| Breeding | 221,825 | 40.23 | 0.0181 |
| Post-breeding | 911,586 | 31.81 | 0.0035 |
| Pre-breeding | 691,526 | 21.20 | 0.0031 |
| Annual | 911,586 | 93.24 | 0.0102 |

14.13.4.68 As the increase in baseline mortality exceeded 0.02 percentage points during the breeding season and annually when considering the upper scenario of the NatureScot Approach, PVA has been carried out for those scenario with the summary results presented in Table 14.66. Further information on the PVA is presented in Appendix 14.5, Volume 2c. Within Appendix 14.5, Volume 2c, there is an explanation as to the robustness of PVA and all associated caveats.

Table 14.66: Summary of cumulative PVA results for kittiwake displacement impacts after 35 years

| Season/ Population | Scenario | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-----------------------|------------------|------------------------------------|-------------------------|------------|------------|------------------------------|----------------------------------|
| Breeding | NatureScot Upper | 124.38 | 1.0022 | 0.9993 | 0.9763 | 0.07 | 2.37 |
| Annual | NatureScot Upper | 285.79 | 1.0019 | 0.9996 | 0.9866 | 0.04 | 1.34 |

14.13.4.69 These PVA results (Table 14.66) predicted a CPS value of 0.9763 for the breeding season under the NatureScot Upper scenario, indicating that the median population size after 35 years would be 2.37% smaller than the unimpacted population in the absence of any cumulative breeding-season impacts. The model predicted a corresponding CGR value of 0.9993, meaning the growth rate of the impacted population would be reduced by only 0.07% compared with the unimpacted population.

14.13.4.70 The annual assessment for the same scenario showed a CPS of 0.9866 and a CGR of 0.9996, corresponding to a 0.04% reduction in growth rate and a 1.34% reduction in population size. These levels of change are small and would likely remain undetectable against natural population variability, indicating that the predicted impacts would not adversely affect the population.

14.13.4.71 The magnitude of impact is therefore considered to be negligible for both the breeding season and annually under the NatureScot Upper scenario.

Sensitivity of VOR

14.13.4.72 As presented in paragraphs 14.9.3.26 to 14.9.3.27, kittiwake are deemed to be of low vulnerability (Table 14.15), low recoverability, and international value. The sensitivity of the receptor is therefore considered to be medium.

Significance of effect

14.13.4.73 Overall, the magnitude of the cumulative impact is deemed to be negligible for all seasons assessed and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of negligible adverse significance, which is not significant in EIA terms.

Mitigation

14.13.4.74 No additional mitigation measures for kittiwake are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19 is not significant in EIA terms.

Razorbill

Magnitude

14.13.4.75 There are 20 other developments which contribute to the cumulative displacement impact on the BDMPS populations of razorbill which have connectivity with the Offshore Project.

14.13.4.76 The cumulative total number of razorbill susceptible to displacement is 410 individuals in the breeding season, 6,974 individuals in the post-breeding season, 6,238 individuals in the non-breeding season, 6,444 individuals in the pre-breeding season and 20,275 annually (Table 14.67). The Offshore Project's contribution to these total abundances is small: 6.70% in the post-breeding season, 0.00% in the non-breeding season, 9.77% in the pre-breeding season, and 7.53% annually. This indicates that, while the project contributes to the cumulative displacement impact, its share remains relatively small compared to the overall cumulative displacement.

Table 14.67: Seasonal population estimates of razorbill for the other developments considered in the CEA

| Project | Season | | | | |
|----------------------|------------------------|---------------|--------------|--------------|--------|
| | Breeding | Post-breeding | Non-breeding | Pre-breeding | Annual |
| Awel y Mor | Outside foraging range | 66 | 150 | 336 | 552 |
| Burbo Bank | Outside foraging range | 6 | 8 | 10 | 24 |
| Burbo Bank Extension | Outside foraging range | 13 | 29 | 23 | 65 |
| Erebus | Outside foraging range | 1,708 | 1,069 | 896 | 3,673 |

| Project | Season | | | | |
|--|------------------------|---------------|--------------|--------------|--------|
| | Breeding | Post-breeding | Non-breeding | Pre-breeding | Annual |
| Gwynt y Mor | Outside foraging range | 22 | 32 | 39 | 93 |
| Llŷr 1 | Outside foraging range | 1,888 | 493 | 257 | 2,638 |
| Mona | Outside foraging range | 91 | 421 | 1,924 | 2,436 |
| Moor Vannin | Outside foraging range | 653 | 214 | 1,192 | 2,060 |
| Morecambe | Outside foraging range | 694 | 651 | 382 | 1,727 |
| Morgan | Outside foraging range | 254 | 1,170 | 328 | 1,751 |
| Ormonde | Outside foraging range | 6 | 8 | 10 | 24 |
| Pentland | Outside foraging range | 17 | 16 | 14 | 47 |
| Rhyl Flats | Outside foraging range | 7 | 10 | 12 | 29 |
| Robin Rigg | Outside foraging range | 11 | 14 | 15 | 40 |
| Twinhub | Outside foraging range | 3 | 53 | 11 | 67 |
| Walney 1 & 2 | Outside foraging range | 25 | 34 | 40 | 99 |
| Walney Extension | Outside foraging range | 873 | 3,066 | 0 | 3,939 |
| West of Duddon Sands | Outside foraging range | 18 | 202 | 28 | 248 |
| West of Orkney | Outside foraging range | 112 | 19 | 132 | 264 |
| White Cross | Outside foraging range | 40 | 361 | 345 | 746 |
| Total abundance | 0 | 6,507 | 6,238 | 5,995 | 18,748 |
| Offshore Project | 410 | 467.23 | 0 | 649 | 1,526 |
| Total abundance (including the Offshore Project) | 410 | 6,974 | 6,238 | 6,644 | 20,275 |

14.13.4.77 As part of the West of Orkney project's consent from the Scottish Government compensation was required as part of a derogation case at 1 SPA. The compensated birds are removed from the predicted seasonal impacts within Table 14.68. MD-LOT and NatureScot confirmed (via email 8

July 2025 and 16 April 2025, respectively) that compensated birds can be excluded from assessment and therefore the Applicant will draw conclusions in respect to these numbers.

14.13.4.78 Within Table 14.68 there is also 8 additional mortalities during the non-breeding season from the West of Anglesey Tidal Energy Demonstrator from underwater collisions.

14.13.4.79 For razorbill when considering the Applicant Approach (50% displacement and 1% mortality) the increase in baseline mortality rate remains below 0.02 for all seasons considered. However, within the breeding, post-breeding, non-breeding seasons and annually when considering NatureScot's upper scenario, the increase in baseline mortality rate exceeds 0.02 percentage points. When considering NatureScot's lower scenario, only annually does the increase in baseline mortality rate exceed 0.02 percentage points.

14.13.4.80 Under all scenarios, the increase in baseline mortality rate does not exceed 0.02 percentage points during the pre-breeding season. Both NatureScot and the Applicant scenarios are included in Table 14.68.

Table 14.68: CEA of predicted displacement mortality estimates for razorbill on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Displacement Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|---|---|---------------------------------------|--|
| NatureScot (60% displacement; 3-5% mortality in breeding season and 1-3% mortality in pre-breeding, post-breeding, and non-breeding seasons) | | | |
| Breeding | 55,523 | 7.38-12.30 | 0.0133-0.0221 |
| Post-breeding | 606,914 | 41.76-125.45 | 0.0069-0.0207 |
| Non-breeding | 341,422 | 56.12-152.35 | 0.0164-0.0446 |
| Pre-breeding | 606,914 | 39.78-119.51 | 0.0066-0.0197 |
| Annual | 606,914 | 145.03-409.60 | 0.0239-0.0675 |
| Applicant (50% displacement; 1% mortality) | | | |
| Breeding | 55,523 | 2.05 | 0.0037 |
| Post-breeding | 606,914 | 34.79 | 0.0057 |
| Non-breeding | 341,422 | 48.14 | 0.0141 |
| Pre-breeding | 606,914 | 33.14 | 0.0055 |
| Annual | 606,914 | 110.07 | 0.0181 |

14.13.4.81 As the increase in baseline mortality exceeded 0.02 percentage points during the breeding, post-breeding, non-breeding season and annually when considering the upper scenario of the NatureScot Approach, PVAs has been carried out for those cumulative scenarios with the summary results presented in Table 14.69. Further information on the cumulative PVAs is presented in Appendix 14.5, Volume 2c. Within Appendix 14.5, Volume 2c, there is an explanation as to the robustness of PVA and all associated caveats.

Table 14.69: Summary of cumulative PVA results for razorbill displacement impacts after 35 years

| Season/ Population | Scenario | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-----------------------|---------------------|--|----------------------------|---------------|---------------|------------------------------------|--|
| Breeding | NatureScot Upper | 12.30 | 0.9763 | 0.9997 | 0.9905 | 0.03 | 0.95 |
| Post- breeding | NatureScot Upper | 125.45 | 0.9763 | 0.9998 | 0.9914 | 0.02 | 0.86 |
| Non- breeding | NatureScot Upper | 152.35 | 0.9760 | 0.9995 | 0.9812 | 0.05 | 1.88 |
| Annual | NatureScot Lower | 145.03 | 0.9763 | 0.9997 | 0.9898 | 0.03 | 1.02 |
| | NatureScot Upper | 409.60 | 0.9758 | 0.9992 | 0.9717 | 0.08 | 2.83 |

14.13.4.82 The PVA results (Table 14.69) predicted a CPS value of 0.9905 for the breeding season under the NatureScot Upper scenario, indicating that the median population size after 35 years would be 0.95% smaller than the unimpacted population in the absence of any cumulative breeding-season impacts. The model predicted a CGR value of 0.9997, meaning the growth rate of the impacted population under cumulative effects would be 0.03% lower than that of the unimpacted population.

14.13.4.83 Predicted impacts in the post-breeding and non-breeding seasons were similarly small, with reductions in growth rate of $\leq 0.05\%$ and reductions in population size of $\leq 1.88\%$. The annual assessment showed slightly larger reductions, with CPS values of 0.9898 and 0.9717, corresponding to reductions in population size of 1.02% and 2.83% and reductions in growth rate of 0.03% and 0.08% under the NatureScot Lower and Upper scenarios, respectively. Across all seasons and scenarios, these levels of change are minimal and would likely remain undetectable against natural population fluctuations and therefore would not adversely affect the population.

14.13.4.84 The magnitude of impact is therefore considered to be negligible for all seasons and under the Applicant Approach, and both NatureScot Lower and Upper scenarios.

Sensitivity of VOR

14.13.4.85 As presented in paragraphs 14.9.3.46 to 14.9.3.49, razorbill are deemed to be of high vulnerability (Table 14.15), high recoverability, and international value. The sensitivity of the receptor is therefore considered to be medium.

Significance of effect

14.13.4.86 Overall, the magnitude of the cumulative impact is deemed to be negligible for all seasons assessed and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of negligible to minor adverse significance, which is not significant in EIA terms.

Mitigation

14.13.4.87 No additional mitigation measures for razorbill are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Puffin

Magnitude

14.13.4.88 There are 21 other developments which contribute to the cumulative displacement impact on the BDMPS populations of puffin which have connectivity with the Offshore Project.

14.13.4.89 The cumulative total number of puffin susceptible to displacement is 24,538 individuals in the breeding season, 3,707 individuals in the non-breeding season and 28,245 annually (Table 14.70). The Offshore Project's contribution to these total abundances is relatively small: 15.96% in the breeding season, 10.09% in the non-breeding season, and 15.19% annually. While these figures indicate some contribution, they remain modest in the context of overall cumulative displacement.

Table 14.70: Seasonal population estimates of puffin for the other developments considered in the CEA

| Project | Season | | |
|----------------------|------------------------|---------------|--------|
| | Breeding | Non-breeding | Annual |
| Awel y Mor | Outside foraging range | 7 | 7 |
| Beatrice | 2,858 | Outside BDMPS | 2,858 |
| Burbo Bank | Outside foraging range | < 1 | < 1 |
| Burbo Bank Extension | Outside foraging range | 264 | 264 |
| Caledonia | 2,061 | Outside BDMPS | 2,061 |
| Erebus | Outside foraging range | 160 | 160 |
| Gwynt y Mor | Outside foraging range | 1 | 1 |
| Llŷr 1 | Outside foraging range | 592 | 592 |
| Mona | Outside foraging range | 22 | 22 |
| Moor Vannin | Outside foraging range | 12 | 12 |
| Moray East | 2,795 | Outside BDMPS | 2,795 |
| Moray West | 1,115 | Outside BDMPS | 1,115 |
| Morecambe | Outside foraging range | 20 | 20 |
| Morgan | Outside foraging range | 5 | 5 |
| Pentland | 6,527 | Outside BDMPS | 6,527 |
| Rhyl Flats | Outside foraging range | < 1 | < 1 |
| Walney 1 & 2 | Outside foraging range | 2 | 2 |
| Walney Extension | Outside foraging range | 40 | 40 |
| West of Duddon Sands | Outside foraging range | 35 | 35 |
| West of Orkney | 5,272 | 2,136 | 7,408 |
| White Cross | Outside foraging range | 31 | 31 |
| Total abundance | 20,622 | 3,333 | 23,954 |
| Offshore Project | 3,917 | 374 | 4,291 |

| Project | Season | | |
|--|----------|--------------|--------|
| | Breeding | Non-breeding | Annual |
| Total abundance (including the Offshore Project) | 24,538 | 3,707 | 28,245 |

14.13.4.90 As part of the West of Orkney project's consent from the Scottish Government compensation was required as part of a derogation case at 1 SPA. The compensated birds are removed from the predicted seasonal impacts within Table 14.71. MD-LOT and NatureScot confirmed (via email 8 July 2025 and 16 April 2025, respectively) that compensated birds can be excluded from assessment and therefore the Applicant will draw conclusions in respect to these numbers.

14.13.4.91 Within Table 14.71 there is also 0.53 additional mortalities annually from the West of Anglesey Tidal Energy Demonstrator from underwater collisions.

14.13.4.92 For puffin when considering the Applicant Approach (50% displacement and 1% mortality) the increase in baseline mortality rate remains below 0.02 for all seasons considered. However, within the breeding season and annually when considering NatureScot's lower and upper scenario, the increase in baseline mortality rate exceeds 0.02 percentage points.

14.13.4.93 Under all scenarios, the increase in baseline mortality rate does not exceed 0.02 percentage points during the post-breeding season. Both NatureScot and the Applicant scenarios are included in Table 14.68.

Table 14.71: CEA of predicted displacement mortality estimates for puffin on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Displacement Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|--|---|---------------------------------------|--|
| NatureScot (60% displacement; 3-5% mortality in breeding season and 1-3% mortality in pre-breeding, post-breeding, and non-breeding seasons) | | | |
| Breeding | 1,194,457 | 441.69-736.15 | 0.0370-0.0616 |
| Non-breeding | 304,557 | 11.93-56.41 | 0.0039-0.0185 |
| Annual | 1,194,457 | 454.14-793.08 | 0.0380-0.0664 |
| Applicant (50% displacement; 1% mortality) | | | |
| Breeding | 1,194,457 | 122.69 | 0.0103 |
| Non-breeding | 304,557 | 8.22 | 0.0027 |
| Annual | 1,194,457 | 131.44 | 0.0110 |

14.13.4.94 As the increase in baseline mortality exceeded 0.02 percentage points during the breeding season and annually when considering the upper and lower scenario of the NatureScot Approach, PVAs have been carried out for those cumulative scenarios with the summary results presented in

Table 14.72. Further information on the cumulative PVAs is presented in Appendix 14.5, Volume 2c. Within Appendix 14.5, Volume 2c, there is an explanation as to the robustness of PVA and all associated caveats.

Table 14.72: Summary of cumulative PVA results for razorbill displacement impacts after 35 years

| Season/ Population | Scenario | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-----------------------|---------------------|--|----------------------------|---------------|---------------|---------------------------------|--|
| Breeding | NatureScot Lower | 441.69 | 0.9716 | 0.9996 | 0.9844 | 0.04 | 1.56 |
| | NatureScot Upper | 736.15 | 0.9713 | 0.9993 | 0.9743 | 0.07 | 2.57 |
| Annual | NatureScot Lower | 454.14 | 0.9716 | 0.9996 | 0.9840 | 0.04 | 1.60 |
| | NatureScot Upper | 793.08 | 0.9713 | 0.9992 | 0.9722 | 0.08 | 2.78 |

14.13.4.95 The PVA results (Table 14.72) predicted CPS values of 0.9844 and 0.9743 for the breeding season under the NatureScot Lower and Upper scenarios, respectively, indicating that the median population size after 35 years would be 1.56 to 2.57% smaller than the unimpacted population in the absence of any cumulative breeding-season impacts. The model predicted corresponding CGR values of 0.9996 and 0.9993, meaning the growth rate of the impacted population under cumulative effects would be reduced by only 0.04–0.07% compared with the unimpacted population.

14.13.4.96 The annual assessment showed similar results, with CPS values of 0.9840 and 0.9722, corresponding to reductions in population size of 1.60% and 2.78%, and CGR values of 0.9996 and 0.9992, corresponding to reductions in growth rate of 0.04% and 0.08% under the NatureScot Lower and Upper scenarios, respectively. These levels of change are small and would likely remain undetectable against natural population fluctuations, indicating that the predicted impacts would not adversely affect the population.

14.13.4.97 The magnitude of impact is therefore considered to be negligible for all seasons and under the Applicant Approach, and both NatureScot Lower and Upper scenarios.

Sensitivity of VOR

14.13.4.98 As presented in paragraphs 14.9.3.55 to 14.9.3.57, puffin are deemed to be of medium vulnerability (Table 14.15), medium recoverability, and international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.13.4.99 Overall, the magnitude of the cumulative impact is deemed to be negligible for all seasons assessed and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Mitigation

14.13.4.100 No additional mitigation measures for puffin are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Gannet

14.13.4.101 There are 41 other developments which contribute to the cumulative displacement impact on the BDMPS populations of gannet which have connectivity with the Offshore Project.

14.13.4.102 The cumulative total number of gannet susceptible to displacement is 22,249 individuals in the breeding season, 3,399 individuals in the post-breeding season, 566 individuals in the pre-breeding season and 26,645 annually (Table 14.73). Including Berwick Bank, the Offshore Project's contribution is 2.40% in the breeding season. Without Berwick Bank, the contribution is 1.90% in the breeding season, 4.65% in the post-breeding season, 5.12% in the pre-breeding season, and 2.82% annually. These figures show that, although the project does contribute to cumulative displacement, its overall share is relatively minor compared with the total.

Table 14.73: Seasonal population estimates of gannet for the other developments considered in the CEA

| Project | Season | | | |
|--|------------------------|---------------|---------------|--------|
| | Breeding | Post-breeding | Pre-breeding | Annual |
| Aberdeen | 35 | Outside BDMPS | Outside BDMPS | 35 |
| Awel y Mor | 328 | 201 | | 529 |
| Beatrice Offshore Wind Farm | 151 | Outside BDMPS | Outside BDMPS | 151 |
| Berwick Bank Offshore Wind Farm | 4,735 | Outside BDMPS | Outside BDMPS | 4,735 |
| Buchan Offshore Wind | 235 | Outside BDMPS | Outside BDMPS | 235 |
| Burbo Bank | Outside foraging range | 5 | 3 | 8 |
| Burbo Bank Extension | 230 | 9 | 8 | 247 |
| Caledonia Offshore Wind Farm | 909 | Outside BDMPS | Outside BDMPS | 909 |
| Cenos Floating Offshore Wind Farm | 216 | Outside BDMPS | Outside BDMPS | 216 |
| Erebus | Outside foraging range | 334 | 10 | 434 |
| Green Volt – Floating Offshore Wind Farm | 198 | Outside BDMPS | Outside BDMPS | 198 |
| Gwynt y Mor | Outside foraging range | 20 | 13 | 33 |

| Project | Season | | | |
|------------------------------------|------------------------|---------------|---------------|--------|
| | Breeding | Post-breeding | Pre-breeding | Annual |
| Hynet Carbon Capture Storage | Outside foraging range | 9 | 9 | 18 |
| Hywind Scotland Pilot Park | 1 | Outside BDMPS | Outside BDMPS | 1 |
| Inch Cape Offshore Wind Farm | 2,398 | Outside BDMPS | Outside BDMPS | 2,398 |
| Kincardine – Phase 1 & Phase 2 | 12 | Outside BDMPS | Outside BDMPS | 12 |
| Llyr 1 | Outside foraging range | 715 | 65 | 78 |
| MeyGen Tidal Energy Project | | | | |
| Mona | Outside foraging range | 58 | 28 | 86 |
| Moor Vannin | 319 | 161 | 21 | 500 |
| Moray East | 564 | Outside BDMPS | Outside BDMPS | 564 |
| Moray West | 2,827 | Outside BDMPS | Outside BDMPS | 2,827 |
| Morecambe | Outside foraging range | 14 | | 14 |
| Morgan | Outside foraging range | 65 | 35 | 100 |
| Muir Mhòr Floating Wind Farm | 597 | Outside BDMPS | Outside BDMPS | 597 |
| Neart na Gaoithe Offshore Windfarm | 1,987 | Outside BDMPS | Outside BDMPS | 1,987 |
| North Irish Sea Array | 304 | Outside BDMPS | Outside BDMPS | 304 |
| Oriel | 264 | Outside BDMPS | Outside BDMPS | 264 |
| Ormonde | Outside foraging range | 6 | 3 | 9 |
| Ossian Floating Offshore Windfarm | 1,393 | Outside BDMPS | Outside BDMPS | 1,393 |
| Pentland | 166 | 24 | 8 | 198 |
| Rhyl Flats | Outside foraging range | 6 | 4 | 1 |
| Robin Rigg | 14 | 7 | 4 | 25 |
| Salamander | 442 | Outside BDMPS | Outside BDMPS | 442 |
| Seagreen Offshore Windfarm | 2,956 | Outside BDMPS | Outside BDMPS | 2,956 |
| Walney 1 & 2 | Outside foraging range | 26 | 15 | 41 |
| Walney Extension | Outside foraging range | 259 | 24 | 283 |
| West of Duddon Sands | Outside foraging range | 18 | 11 | 29 |
| West of Orkney | 851.70 | 1,171 | 140 | 2,162 |
| White Cross | Outside foraging range | 141 | 57 | 198 |

| Project | Season | | | |
|---|------------------------|---------------|--------------|--------|
| | Breeding | Post-breeding | Pre-breeding | Annual |
| TwinHub (Wave Hub Floating Wind Farm) | Outside foraging range | 153 | 10 | 163 |
| Total abundance (with Berwick Bank) | 22,249 | 3,241 | 536 | 26,027 |
| Total abundance (without Berwick Bank) | 17,514 | 3,241 | 536 | 21,292 |
| Offshore Project | 431 | 158 | 29 | 618 |
| Total abundance (including the Offshore Project and Berwick Bank) | 22,681 | 3,399 | 566 | 26,645 |
| Total abundance (including the Offshore Project but without Berwick Bank) | 17,946 | 3,399 | 566 | 21,910 |

14.13.4.103 As previously explained within the CEA for collision impacts on gannet (paragraph 14.13.4.48) scenario 3 considers a CEA with Berwick Bank and scenario 4 considers a CEA without Berwick Bank. Both scenario 3 and scenario 4 consider the removal of compensated birds from West of Orkney, Berwick Bank (scenario 3 only), GreenVolt and Salamander. The predicted impact for scenario 3 is presented in Table 14.74 and the predicted impact for scenario 4 is presented in Table 14.75. MD-LOT and NatureScot confirmed (via email 8 July 2025 and 16 April 2025, respectively) that compensated birds can be excluded from assessment and therefore the Applicant will draw conclusions in respect to these numbers.

14.13.4.104 When considering the Applicant Approach and the lower scenario of NatureScot's approach (70% displacement and 1% mortality) no scenario increases the baseline mortality rate by over 0.02 percentage points. However, when considering upper scenario of the NatureScot approach (70% displacement and 3% mortality) the increase in baseline mortality rate during the breeding season and annually is greater than 0.02 percentage points, therefore these scenarios require PVA. These results occur with and without Berwick Bank. Further information on the PVA is presented in Appendix 14.5, Volume. Within Appendix 14.5, Volume 2c, there is an explanation as to the robustness of PVA and all associated caveats.

Table 14.74: CEA of predicted displacement mortality estimates for gannet on seasonal and annual bases against the baseline mortality of relevant regional populations (scenario 3 - with Berwick Bank)

| Season | Regional Baseline Population (No. of Birds) | Displacement Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|--|---|---------------------------------------|--|
| NatureScot (70% displacement; 1-3% mortality) | | | |
| Breeding | 922,238 | 69.41-386.94 | 0.0075-0.0420 |

| Season | Regional Baseline Population (No. of Birds) | Displacement Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|--|---|---------------------------------------|--|
| NatureScot (70% displacement; 1-3% mortality) | | | |
| Post-breeding | 545,954 | 13.95-61.54 | 0.0026-0.0113 |
| Pre-breeding | 661,888 | 2.58-10.50 | 0.0004-0.0016 |
| Annual | 922,238 | 68.20-441.23 | 0.0074-0.0478 |
| Applicant (70% displacement; 1% mortality) | | | |
| Breeding | 922,238 | 69.41 | 0.0075 |
| Post-breeding | 545,954 | 13.95 | 0.0026 |
| Pre-breeding | 661,888 | 2.58 | 0.0004 |
| Annual | 922,238 | 68.20 | 0.0074 |

Table 14.75: CEA of predicted displacement mortality estimates for gannet on seasonal and annual bases against the baseline mortality of relevant regional populations (scenario 4 - without Berwick Bank)

| Season | Regional Baseline Population (No. of Birds) | Displacement Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|--|---|---------------------------------------|--|
| NatureScot (70% displacement; 1-3% mortality) | | | |
| Breeding | 922,238 | 124.24-375.48 | 0.0135-0.0407 |
| Post-breeding | 545,954 | 13.95-61.54 | 0.0026-0.0113 |
| Pre-breeding | 661,888 | 2.58-10.50 | 0.0004-0.0016 |
| Annual | 922,238 | 153.37-460.12 | 0.0166-0.0499 |
| Applicant (70% displacement; 1% mortality) | | | |
| Breeding | 922,238 | 124.24 | 0.0135 |
| Post-breeding | 545,954 | 13.95 | 0.0026 |
| Pre-breeding | 661,888 | 2.58 | 0.0004 |
| Annual | 922,238 | 153.37 | 0.0166 |

14.13.4.105 The PVA results (Table 14.76) predicted CPS values of 0.9822 and 0.9827 for the breeding season under the NatureScot Upper scenario with and without Berwick Bank, respectively, indicating that the median population size after 35 years would be 1.73 to 1.78% smaller than the unimpacted population in the absence of any cumulative breeding-season impacts. The model predicted corresponding CGR values of 0.9995 for both scenarios, meaning the growth rate of the impacted population under cumulative effects would be reduced by only 0.05% compared with the unimpacted population.

Table 14.76: Summary of cumulative PVA results for gannet displacement impacts after 35 years

| Season/ Population | Scenario | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-----------------------|---|--|----------------------------|---------------|---------------|------------------------------------|--|
| Breeding | NatureScot Upper (with Berwick Bank) | 386.94 | 1.0119 | 0.9995 | 0.9822 | 0.05 | 1.78 |
| | NatureScot Upper (without Berwick Bank) | 375.45 | 1.0119 | 0.9995 | 0.9827 | 0.05 | 1.73 |
| Annual | NatureScot Upper (with Berwick Bank) | 441.23 | 1.0118 | 0.9994 | 0.9797 | 0.06 | 2.03 |
| | NatureScot Upper (without Berwick Bank) | 460.12 | 1.0118 | 0.9994 | 0.9790 | 0.06 | 2.10 |

14.13.4.106 The annual assessment showed slightly larger reductions, with CPS values of 0.9797 and 0.9790, corresponding to reductions in population size of 2.03 to 2.10%, and CGR values of 0.9994 for both scenarios, corresponding to reductions in growth rate of 0.06%. These levels of change are minor and would likely remain undetectable against natural population fluctuations, indicating that the predicted impacts would not adversely affect the population.

14.13.4.107 The magnitude of impact is therefore considered to be negligible for the breeding season and annually, both with and without Berwick Bank.

Sensitivity of VOR

14.13.4.108 As previously presented gannet are deemed to be of high vulnerability (Table 14 15), medium recoverability, and international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.13.4.109 Overall, the magnitude of the cumulative impact is deemed to be negligible for all seasons assessed and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Mitigation

14.13.4.110 No additional mitigation measures for gannet are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Combined collision risk and distributional responses (displacement)

Kittiwake

Magnitude

- 14.13.4.111 To calculate the cumulative combined impact on kittiwake the impacts presented within Table 14.49 for cumulative collision impact and Table 14.65 for cumulative displacement impact have been summed together. Following NatureScot and MD-LOT guidance, the combined collision and distributional responses (displacement) assessment only uses the predicted impact when considering the removal of compensated birds.
- 14.13.4.112 The mortality range presented in Table 14.77 incorporates both the Applicant and NatureScot lower approach value (represented by the lower estimate) and the NatureScot Upper value (represented by the upper estimate).
- 14.13.4.113 In all 3 seasons (pre-breeding, breeding and post breeding) and also on an annual basis, the estimated increase in baseline mortality is greater than the 0.02 percentage point increase threshold as defined by NatureScot (Table 14.77). Therefore multiple PVAs are required to assessed how the increase in baseline mortality rate effects the population trends of kittiwake. Further information on the PVAs is presented in Appendix 14.5, Volume 2c.

Table 14.77: CEA of predicted displacement and collision mortality estimates for kittiwake on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Displacement Mortality (No. of Birds) | Collision Mortality (No. of Birds) | Combined Mortality (No. of birds) | Change in Baseline Mortality (Percentage Point Change) |
|---------------|---|---------------------------------------|------------------------------------|-----------------------------------|--|
| Breeding | 221,825 | 40.23-124.38 | 215.55 | 255.78-339.94 | 0.1153-0.1532 |
| Post-breeding | 911,586 | 31.81-96.20 | 250.63 | 282.44-346.82 | 0.0310-0.0380 |
| Pre-breeding | 691,526 | 21.20-65.21 | 256.79 | 277.98-321.99 | 0.0402-0.0466 |
| Annual | 911,586 | 93.24-285.79 | 722.96 | 816.20-1,008.75 | 0.0895-0.1107 |

- 14.13.4.114 The cumulative PVA results during the breeding season (Table 14.78) indicate a median CGR of 0.9986-0.9982 and a median CPS of 0.9521-0.9366; i.e. the population growth rate would be 0.14-0.18% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 4.79-6.34% smaller than the counterfactual population size.
- 14.13.4.115 The cumulative PVA results during the post-breeding season (Table 14.78) indicate a median CGR of 0.9996-0.9995 and a median CPS of 0.9869-0.9840; i.e. the population growth rate would be 0.04-0.05% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 1.16-1.31% smaller than the counterfactual population size.

14.13.4.116 The cumulative PVA results during the pre-breeding season (Table 14.78) indicate a median CGR of 0.9995-0.9994 and a median CPS of 0.9830-0.9804; i.e. the population growth rate would be 0.05-0.06% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 1.70-1.96% smaller than the counterfactual population size.

14.13.4.117 The cumulative PVA results annually (Table 14.78) indicate a median CGR of 0.09989-0.9987 and a median CPS of 0.9625-0.9539; i.e. the population growth rate would be 0.11-0.13% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 3.75-4.61% smaller than the counterfactual population size.

Table 14.78: Summary of cumulative PVA results for kittiwake combined collision and displacement impacts after 35 years

| Season/ Population | Scenario | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-----------------------|---|--|----------------------------|---------------|---------------|------------------------------------|--|
| Breeding | NatureScot Lower and Applicant Approach | 255.78 | 1.0015 | 0.9986 | 0.9521 | 0.14 | 4.79 |
| | NatureScot Upper | 339.94 | 1.0010 | 0.9982 | 0.9366 | 0.18 | 6.34 |
| Post- breeding | NatureScot Lower and Applicant Approach | 282.44 | 1.0019 | 0.9996 | 0.9869 | 0.04 | 1.31 |
| | NatureScot Upper | 346.82 | 1.0018 | 0.9995 | 0.9840 | 0.05 | 1.60 |
| Pre- breeding | NatureScot Lower and Applicant Approach | 277.98 | 1.0018 | 0.9995 | 0.9830 | 0.05 | 1.70 |
| | NatureScot Upper | 321.99 | 1.0017 | 0.9994 | 0.9804 | 0.06 | 1.96 |
| Annual | NatureScot Lower and Applicant Approach | 816.20 | 1.0012 | 0.9989 | 0.9625 | 0.11 | 3.75 |
| | NatureScot Upper | 1,008.75 | 1.0010 | 0.9987 | 0.9539 | 0.13 | 4.61 |

14.13.4.118 These results (Table 14.78) indicate that the predicted cumulative impact would not adversely affect the population and would only result in a slight reduction in the growth rate currently seen in the population, up to 0.18% change during the breeding season when considering NatureScot's upper (30% displacement and 3% mortality) scenario but still indicating a positive (>1) growth rate. Therefore, any predicted change would therefore be undetectable against natural population fluctuations. The population is predicted to increase under all the modelled parameters. Therefore, the magnitude of impact is considered to be negligible.

Sensitivity of VOR

14.13.4.119 Kittiwake are deemed to be of low vulnerability to displacement and high vulnerability to collision, low recoverability, and international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.13.4.120 Overall, the magnitude of the cumulative combined impact of collision and displacement is deemed to be negligible for all seasons assessed and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Mitigation

14.13.4.121 No additional mitigation measures for kittiwake are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Red-throated diver

Magnitude

14.13.4.122 As stated within paragraph 14.13.2.10, there are no other developments which have the potential to impact red-throated diver through distributional impacts. However, the Isle of Lewis has a population of breeding red-throated diver and multiple onshore wind farms. Many of these onshore wind farms have undertaken collision risk modelling for their impact on red-throated divers. Therefore, a combined displacement and collision assessment is presented within Table 14.79. The Offshore Project's contribution to the annual total is 68.18%. Although this proportion appears high, it represents only 1.2 birds out of a total predicted annual effect of 1.76 birds, highlighting the small absolute scale of the combined impact due to an overall lack of projects which could have a cumulative impact on the breeding red-throated divers of Lewis.

Table 14.79: CEA of predicted displacement and collision mortality estimates for red-throated diver on seasonal and annual bases

| Project | Season | | | | Annual mortality (collision/displacement) |
|--------------------------|--------------------------------|---------------|--------------|--------------|---|
| | Breeding | Post-breeding | Non-breeding | Pre-breeding | |
| Loch Sminig Wind Farm | No seasonal breakdown provided | | | | 0.00 |
| Beinn Greidaig Wind Farm | No seasonal breakdown provided | | | | 0.09 |
| Pentland Road Wind Farm | No seasonal breakdown provided | | | | 0.00 |
| Uisenis Wind Farm | No seasonal breakdown provided | | | | 0.01 |
| Stornoway Wind Farm | No seasonal breakdown provided | | | | 0.46 |

| Project | Season | | | | Annual mortality (collision/displacement) |
|--|--------------------------------|---------------|--------------|--------------|---|
| | Breeding | Post-breeding | Non-breeding | Pre-breeding | |
| Cearn an Ora Wind Farm | No seasonal breakdown provided | | | | 0.00 |
| Baile an Truseil Wind Farm | No seasonal breakdown provided | | | | 0.00 |
| Arnish Moor Wind Farm | No seasonal breakdown provided | | | | 0.00 |
| Loch Carnan Wind Farm | No seasonal breakdown provided | | | | 0.00 |
| Druim Leathann Wind Farm | No seasonal breakdown provided | | | | 0.00 |
| Creed Wind Farm | No seasonal breakdown provided | | | | 0.00 |
| Bridge Cottages Wind Farm | No seasonal breakdown provided | | | | 0.00 |
| Horshader Wind Farm | No seasonal breakdown provided | | | | 0.00 |
| Tolsta Community Wind Farm | No seasonal breakdown provided | | | | 0.00 |
| Total | - | - | - | - | 0.56 |
| Offshore Project | 0.4 | 0.4 | 0.00 | 0.4 | 1.20 |
| Total (including the Offshore Project) | 0.4 | 0.4 | 0.00 | 0.4 | 1.76 |

14.13.4.123 During the post-breeding, pre-breeding and non-breeding seasons, the increase in baseline mortality rate is less than 0.02 percentage points. However, during the breeding season and annually, the estimated increase in baseline mortality is greater than the 0.02 percentage point increase threshold as defined by NatureScot (Table 14.80). Therefore, multiple PVAs are required to assessed how the increase in baseline mortality rate effects the population trends of red-throated diver. Further information on the PVAs is presented in Appendix 14.5, Volume 2c.

Table 14.80: CEA of predicted displacement and collision mortality estimates for red-throated diver on seasonal and annual bases against the baseline mortality of relevant regional populations

| Season | Regional Baseline Population (No. of Birds) | Displacement and Collision Mortality (No. of Birds) | Change in Baseline Mortality (Percentage Point Change) |
|---------------|---|---|--|
| Breeding | 278 | 0.4 | 0.1439 |
| Post-breeding | 4,373 | 0.4 | 0.0091 |
| Non-breeding | 861 | 0.0 | 0.0000 |
| Pre-breeding | 4,373 | 0.4 | 0.0091 |
| Annual | 4,373 | 1.76 | 0.0403 |

14.13.4.124 The cumulative PVA results during the breeding season (Table 14.81) indicate a median CGR of 0.9981 and a median CPS of 0.9365; i.e. the population growth rate would be 0.19% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 6.35% smaller than the counterfactual population size.

14.13.4.125 The cumulative PVA results annually (Table 14.81) indicate a median CGR of 0.9995 and a median CPS of 0.9798; i.e. the population growth rate would be 0.05% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 2.02% smaller than the counterfactual population size.

Table 14.81: Summary of cumulative PVA results for red-throated diver combined collision and displacement impacts after 35 years

| Season/ Population | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-----------------------|---------------------------------------|----------------------------|---------------|---------------|---------------------------------|-------------------------------------|
| Breeding | 0.40 | 0.9715 | 0.9981 | 0.9365 | 0.19 | 6.35 |
| Annual | 1.76 | 0.9741 | 0.9995 | 0.9798 | 0.05 | 2.02 |

14.13.4.126 These results (Table 14.81) indicate that the predicted cumulative impact would not adversely affect the population and would only result in a slight reduction in the growth rate currently seen in the population, up to 0.19% change in the growth rate during the breeding season. Therefore, any predicted change would therefore be undetectable against natural population fluctuations. The population is predicted to increase under all the modelled parameters. Therefore, the magnitude of impact is considered to be negligible.

Sensitivity of VOR

14.13.4.127 Red-throated diver are deemed to be of high vulnerability to displacement and medium vulnerability to collision (Table 14.10), medium recoverability, and international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.13.4.128 Overall, the magnitude of the cumulative combined impact of collision and displacement is deemed to be negligible for all seasons assessed and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Mitigation

14.13.4.129 No additional mitigation measures for red-throated diver are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

Gannet

Magnitude

- 14.13.4.130 To calculate the cumulative combined impact on gannet the impacts presented within Table 14.60 for cumulative collision impact and Table 14.73 for cumulative displacement impact have been summed together. Following NatureScot and MD-LOT guidance, the combined collision and distributional responses (displacement) assessment only uses the predicted impact when considering the removal of compensated birds.
- 14.13.4.131 The mortality range presented in Table 14.82 incorporates both the Applicant value (represented by the lower estimate) and the NatureScot Upper value (represented by the upper estimate). As the NatureScot Lower value falls between these two bounds, it does not need to be shown separately; the combined assessment already captures the full range of potential outcomes by considering the minimum and maximum values that a combined impact could produce.
- 14.13.4.132 Due to the foraging range of gannet, Berwick Bank is included in the breeding-season assessment as it falls within the species' foraging extent. In line with the requests from NatureScot and MD-LOT (rows regarding a meeting on 16 April 2025 for NatureScot request and rows regarding an email from MD-LOT within Appendix 14.6, Volume 2c), the cumulative assessment must therefore consider two scenarios: one in which Berwick Bank impacts are included (Table 14.82), and one in which they are excluded (Table 14.83). The mortality range presented in Table 14.82 incorporates both the Applicant and NatureScot lower approach value (represented by the lower estimate) and the NatureScot Upper value (represented by the upper estimate).
- 14.13.4.133 In the breeding season and also on an annual basis, the estimated increase in baseline mortality is greater than the 0.02 percentage point increase threshold as defined by NatureScot with Berwick Bank included (Table 14.82) and when Berwick Bank is excluded (Table 14.83). Therefore, multiple PVAs are required to be assessed how the increase in baseline mortality rate effects the population trends of gannet. Further information on the PVAs is presented in Appendix 14.5, Volume 2c.

Table 14.82: CEA of predicted displacement and collision mortality estimates for gannet on seasonal and annual bases against the baseline mortality of relevant regional populations (with Berwick Bank)

| Season | Regional Baseline Population (No. of Birds) | Displacement Mortality (No. of Birds) | Collision Mortality (No. of Birds) | Combined Mortality (No. of birds) | Change in Baseline Mortality (Percentage Point Change) |
|---------------|---|---------------------------------------|------------------------------------|-----------------------------------|--|
| Breeding | 922,238 | 69.41-386.94 | 580.66 | 650.07-967.60 | 0.0705-0.1049 |
| Post-breeding | 545,954 | 13.95-61.54 | 27.38 | 41.34-88.93 | 0.0076-0.0163 |
| Pre-breeding | 661,888 | 2.58-10.50 | 11.52 | 14.10-22.02 | 0.0021-0.0033 |
| Annual | 922,238 | 68.20-441.23 | 609.17 | 677.36-1,050.40 | 0.0734-0.1139 |

Table 14.83: CEA of predicted displacement and collision mortality estimates for gannet on seasonal and annual bases against the baseline mortality of relevant regional populations (without Berwick Bank)

| Season | Regional Baseline Population (No. of Birds) | Displacement Mortality (No. of Birds) | Collision Mortality (No. of Birds) | Combined Mortality (No. of birds) | Change in Baseline Mortality (Percentage Point Change) |
|---------------|---|---------------------------------------|------------------------------------|-----------------------------------|--|
| Breeding | 922,238 | 124.24-375.48 | 620.13 | 744.30-995.54 | 0.0807-0.1079 |
| Post-breeding | 545,954 | 13.95-61.54 | 27.38 | 41.34-88.93 | 0.0076-0.0163 |
| Pre-breeding | 661,888 | 2.58-10.50 | 11.52 | 14.10-22.02 | 0.0021-0.0033 |
| Annual | 922,238 | 153.37-460.12 | 614.56 | 752.61-1,059.36 | 0.0816-0.1149 |

- 14.13.4.134 The cumulative PVA results during the breeding season and including Berwick Bank (Table 14.84) indicate a median CGR of 0.9988-0.9992 and a median CPS of 0.9562-0.9702; i.e. the population growth rate would be 0.08-0.12% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 2.98-4.38% smaller than the counterfactual population size.
- 14.13.4.135 The cumulative PVA results during the breeding season but excluding Berwick Bank (Table 14.84) indicate a median CGR of 0.9987-0.9990 and a median CPS of 0.9549-0.9661; i.e. the population growth rate would be 0.10-0.13% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 3.39-4.51% smaller than the counterfactual population size.
- 14.13.4.136 The cumulative PVA results annually and including Berwick Bank (Table 14.84) indicate a median CGR of 0.09986-0.9991 and a median CPS of 0.9524-0.9690; i.e. the population growth rate would be 0.09-0.14% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 3.10-4.76% smaller than the counterfactual population size.
- 14.13.4.137 The cumulative PVA results annually but excluding Berwick Bank (Table 14.84) indicate a median CGR of 0.09986-0.9990 and a median CPS of 0.9521-0.9656; i.e. the population growth rate would be 0.10-0.14% smaller than the counterfactual (unimpacted) growth rate leading to a population that is, after 35 years, 3.44-4.79% smaller than the counterfactual population size.

Table 14.84: Summary of cumulative PVA results for gannet combined collision and displacement impacts after 35 years

| Season/ Population | Scenario | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-----------------------|---|------------------------------------|-------------------------|------------|------------|------------------------------|----------------------------------|
| Breeding | NatureScot Lower and Applicant Approach (with Berwick Bank) | 650.07 | 1.0115 | 0.9992 | 0.9702 | 0.08 | 2.98 |

| Season/ Population | Scenario | Predicted Mortality (No. of Birds) | Growth Rate (Annual GR) | Median CGR | Median CPS | Reduction in Growth Rate (%) | Reduction in Population Size (%) |
|-----------------------|--|--|----------------------------------|---------------|---------------|------------------------------------|--|
| | NatureScot Lower and Applicant Approach (without Berwick Bank) | 744.30 | 1.0114 | 0.9990 | 0.9661 | 0.10 | 3.39 |
| | NatureScot Upper (with Berwick Bank) | 967.60 | 1.0111 | 0.9988 | 0.9562 | 0.12 | 4.38 |
| | NatureScot Upper (without Berwick Bank) | 995.54 | 1.0111 | 0.9987 | 0.9549 | 0.13 | 4.51 |
| Annual | NatureScot Lower and Applicant Approach (with Berwick Bank) | 677.36 | 1.0115 | 0.9991 | 0.9690 | 0.09 | 3.10 |
| | NatureScot Lower and Applicant Approach (without Berwick Bank) | 752.61 | 1.0114 | 0.9990 | 0.9656 | 0.10 | 3.44 |
| | NatureScot Upper (with Berwick Bank) | 1050.40 | 1.0110 | 0.9986 | 0.9524 | 0.14 | 4.76 |
| | NatureScot Upper (without Berwick Bank) | 1059.36 | 1.0110 | 0.9986 | 0.9521 | 0.14 | 4.79 |

14.13.4.138 These results (Table 14.84) indicates that the predicted cumulative impact would not adversely affect the population and would only result in a slight reduction in the growth rate currently seen in the population, up to 0.14% change annually when considering NatureScot's upper (70% displacement and 3% mortality) scenario and with or without Berwick Bank. Even under this worst-case scenario the PVA still predicts a positive (>1) growth rate. Therefore, any predicted change would therefore be undetectable against natural population fluctuations. The population is predicted to increase under all the modelled parameters. Therefore, the magnitude of impact is considered to be negligible.

Sensitivity of VOR

14.13.4.139 Gannet are deemed to be of high vulnerability to displacement and high vulnerability to collision (Table 14.10), medium recoverability, and international value. The sensitivity of the receptor is therefore considered to be high.

Significance of effect

14.13.4.140 Overall, the magnitude of the cumulative combined impact of collision and displacement is deemed to be negligible for all seasons assessed and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of minor adverse significance, which is not significant in EIA terms.

Mitigation

14.13.4.141 No additional mitigation measures for gannet are considered necessary because the likely effect in the absence of further mitigation (beyond the embedded mitigation measures outlined in Table 14.19) is not significant in EIA terms.

14.14 TRANSBOUNDARY EFFECTS

14.14.1.1 Transboundary effects occur when a development in one European Economic Area (EEA) State impacts the environment of another EEA State(s). A screening of potential transboundary effects was undertaken within the Scoping Report.

14.14.2 APPROACH

14.14.2.1 A screening of potential transboundary effects has been undertaken in line with the requirements of the EIA Directive (2011/92/EU as amended by 2014/52/EU) and the Espoo Convention on Environmental Impact Assessment. This assessment focuses on whether the Offshore Project, either alone or cumulatively with other plans and projects, could give rise to significant effects on the environment of other EEA states.

14.14.2.2 The assessment primarily considers Marine and Nearshore Ornithology, given the potential for seabird and waterbird species to move between jurisdictions. The approach taken includes identifying relevant receptors, reviewing foraging ranges and population scales (e.g. BDMPS and biogeographic populations), and considering the potential for cumulative effects with OWFs located outside UK waters. Where data are available, these have been incorporated; however, it is noted that some non-UK projects are either operational without comparable datasets or are still in early stages with limited public data. In such cases, a precautionary but proportionate approach has been applied. The assessment also takes into account the broader spatial scale over which seabirds operate, and the fact that many of the population baselines used already account for transboundary movements.

14.14.3 TRANSBOUNDARY EFFECTS ASSESSMENT

14.14.3.1 An assessment of potential transboundary impacts has been undertaken to determine whether the Offshore Project, either alone or in combination with other relevant plans and projects, could give rise to significant effects on the interests of EEA states in relation to Marine and Nearshore Ornithology. This assessment forms part of the EIA process. The potential transboundary impacts identified are summarised below:

- Disturbance and displacement from the physical presence of wind turbines and maintenance activities;
- Collision with wind turbines.

- 14.14.3.2 For Marine and Nearshore Ornithology, impacts were assessed against regional population estimates. These regional populations were defined based on seabird foraging ranges, SMP data (Woodward *et al.*, 2019; NatureScot, 2023b; Burnell *et al.*, 2023), and the West of Scotland/*Alba* or UK Western Waters (plus Channel if applicable to the species) BDMPS (Furness, 2015). This approach, detailed in section 4.2 within Appendix 14.1, Volume 2c, covers both the breeding and non-breeding seasons.
- 14.14.3.3 Given the location of the Offshore Project, no significant transboundary effects on seabirds are anticipated during the breeding season. This is because no non-UK seabird colonies lie within the mean-maximum recommended foraging range (NatureScot, 2023b) of the Offshore Project.
- 14.14.3.4 During the non-breeding season, birds from non-UK colonies may occur within the Offshore Project area. However, as these individuals are likely to be transient, any additional energetic costs associated with foraging beyond the Offshore Project are expected to be negligible. While there is potential for collisions and displacement at OWFs located outside UK territorial waters, key receptors are able to travel more widely during the non-breeding season and may come into contact with OWFs in other EEA states. However, since the spatial scope for a transboundary assessment would be much larger than that considered for the Offshore Project alone or cumulatively with other UK projects, any assessment of potential impacts and effects would be made against correspondingly larger seabird populations, reflecting a broader BDMPS or biogeographic scale. Consequently, the relative scale of offshore wind development within such a wider context would be much smaller when compared to the total reference populations. Therefore, the inclusion of non-UK OWFs is considered highly unlikely to alter the conclusions of the existing cumulative impact assessment and, if anything, would likely result in a reduction in the estimated scale of impacts at the population level.
- 14.14.3.5 There is potential for transboundary collisions and displacement associated with offshore renewable energy projects in Irish waters, including the operational Arklow Bank and proposed developments such as Codling Wind Park, Oriel Wind Farm, and the North Irish Sea Array. It is likely that there will be temporal overlap within the operational phases of at least some of these projects. However, Arklow Bank, due to its age, lacks a comparable dataset and the assessment of potential transboundary effects is currently limited by the availability of data. For the other proposed OWFs, all have concluded that there would be no potential for significant transboundary effects with regard to Marine and Nearshore Ornithology from those projects upon the interests of the UK or other EEA States. Furthermore, there remains a high degree of uncertainty regarding which of these projects will ultimately be consented and constructed.
- 14.14.3.6 During the breeding season, it is highly unlikely that even wide-ranging species such as gannet would travel beyond the Irish and Celtic Seas (Wakefield *et al.*, 2014; Woodward *et al.*, 2019). Therefore, developments outside of UK and Irish waters are not expected to contribute significantly to any transboundary effects.

- 14.14.3.7 Moreover, as the BDMPS and biogeographic populations used for impact assessments already encompass transboundary populations (or a relevant proportion of them), such impacts are inherently accounted for within the assessment. As such, potential transboundary impacts from collision and displacement are assessed as at most, minor and are not considered significant in EIA terms. This potential impact is therefore not expected to give rise to a significant transboundary effect.
- 14.14.3.8 Overall, there is negligible potential for significant transboundary effects with regard to Marine and Nearshore Ornithology from the Offshore Project upon the interests of the other EEA States.

14.15 SUMMARY OF RESIDUAL EFFECTS

- 14.15.1.1 Information on Marine and Nearshore Ornithology within the Marine and Nearshore Ornithology Study Area was collected through a desktop study and site-specific DAS. An assessment of the impacts resulting from the Offshore Project has been carried out using the methodology set out in Section 14.5, in line with the guidance policy and legislation set out in Section 14.2 and informed through the consultation process as described in Section 14.3.
- 14.15.1.2 Table 14.85 presents a summary of the potential effects, embedded mitigation measures and the conclusion of the significance of effect in EIA terms in respect to Marine and Nearshore Ornithology for the Offshore Project alone. The effects assessed include:
- Temporary habitat loss and disturbance;
 - Indirect effects through effects on prey species;
 - Response to artificial lighting;
 - Collision risk;
 - Distributional responses (displacement) associated with the Offshore Project;
 - Collision and displacement combined;
 - Barrier effects;
 - Long-term habitat loss (i.e. duration of the Offshore Project).
- 14.15.1.3 Where no additional mitigation is proposed, the significance of effects remains the same as the residual effects identified for the Offshore Project alone assessment.
- 14.15.1.4 Overall, it is concluded that there will be no significant adverse effects arising from the Offshore Project alone during the construction, O&M or decommissioning phases.
- 14.15.1.5 Table 14.86 presents a summary of the potential impacts from the Offshore Project cumulatively with other plans and projects, embedded mitigation measures and the conclusion of significant adverse effects in EIA terms in respect to Marine and Nearshore Ornithology. Where no additional mitigation is proposed, the significance of effects is the same as the residual effects significance.
- 14.15.1.6 The cumulative effects assessed include:

- Collision risk;
- Distributional responses (displacement) associated with the Offshore Project;
- Collision and displacement combined.

14.15.1.7 Overall, it is concluded that there will be no significant adverse effects arising from the Offshore Project cumulatively with other plans and projects, during the construction, O&M or decommissioning phases

14.15.1.8 No significant adverse combined effects or transboundary effects have been identified in relation to the Offshore Project. Similarly, the whole project assessment concluded no significant adverse effects.

Table 14.85 Summary of residual effects for the Offshore Project alone

| Activity and impact | Receptor | Magnitude of impact | Receptor sensitivity or value | Embedded mitigation measures | Significance of effect (significance) | Further environmental mitigation | Significance of residual effect (significance) |
|--|-------------------------|---------------------|-------------------------------|------------------------------|---------------------------------------|----------------------------------|--|
| Construction | | | | | | | |
| Temporary habitat loss and disturbance | Kittiwake | Negligible | Low | M001 M002 | Negligible (Not Significant) | None required | Negligible (Not Significant) |
| | Guillemot | Negligible | Medium | M004 M005 | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Razorbill | Negligible | Low | M010 M014 | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Puffin | Negligible | Medium | M018 M019 | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Red-throated diver | Low | High | M022 M023 | Minor (Not Significant) | | Minor (Not Significant) |
| | Great northern diver | Negligible | Medium | M025 M031 M033 | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Gannet | Negligible | Low | M036 | Negligible (Not Significant) | | Negligible (Not Significant) |
| Indirect effects through effects on prey species | Kittiwake | Negligible | High | M001 M002 | Minor (Not Significant) | None required | Minor (Not Significant) |
| | Great black-backed gull | Negligible | High | M004 M005 | Minor (Not Significant) | | Minor (Not Significant) |
| | Herring gull | Negligible | Low | M006 M014 | Negligible (Not Significant) | | Negligible (Not Significant) |

| Activity and impact | Receptor | Magnitude of impact | Receptor sensitivity or value | Embedded mitigation measures | Significance of effect (significance) | Further environmental mitigation | Significance of residual effect (significance) |
|---------------------------------|----------------------|---------------------|-------------------------------|--|---------------------------------------|----------------------------------|--|
| | Arctic tern | Negligible | High | M018 M019 M021 M022 M025 M031 M033 M036 | Minor (Not Significant) | | Minor (Not Significant) |
| | Guillemot | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |
| | Razorbill | Negligible | Medium | | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Puffin | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |
| | Red-throated diver | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |
| | Great northern diver | Negligible | Medium | | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Fulmar | Negligible | Medium | | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Manx shearwater | Negligible | Medium | | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Gannet | Negligible | Medium | | Negligible (Not Significant) | | Negligible (Not Significant) |
| Response to artificial lighting | Fulmar | Negligible | High | M014 M016 M019 M022 M025 M031 M033 | Minor (Not Significant) | None required | Minor (Not Significant) |
| | Manx shearwater | Negligible | Low | | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Storm petrel | Negligible | Medium | | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Leach's petrel | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |

| Activity and impact | Receptor | Magnitude of impact | Receptor sensitivity or value | Embedded mitigation measures | Significance of effect (significance) | Further environmental mitigation | Significance of residual effect (significance) |
|---|-------------------------|---------------------|-------------------------------|------------------------------|---------------------------------------|----------------------------------|--|
| Operation and maintenance | | | | | | | |
| Collision risk | Kittiwake | Negligible | High | M014 | Minor (Not Significant) | None required | Minor (Not Significant) |
| | Great black-backed gull | Negligible | Very high | M016 M019 M022 | Minor (Not Significant) | | Minor (Not Significant) |
| | Herring gull | Negligible | High | M025 | Minor (Not Significant) | | Minor (Not Significant) |
| | Arctic tern | Negligible | High | M033 | Minor (Not Significant) | | Minor (Not Significant) |
| | Fulmar | Negligible | Medium | | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Manx shearwater | Negligible | Negligible | | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Gannet | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |
| | Migratory birds | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |
| Distributional responses (displacement) associated with the | Kittiwake | Negligible | Medium | M001 M014 | Negligible (Not Significant) | None required | Negligible (Not Significant) |
| | Guillemot | Negligible | High | M018 | Minor (Not Significant) | | Minor (Not Significant) |
| | Razorbill | Negligible | Medium | M019 M022 | Negligible (Not Significant) | | Negligible (Not Significant) |

| Activity and impact | Receptor | Magnitude of impact | Receptor sensitivity or value | Embedded mitigation measures | Significance of effect (significance) | Further environmental mitigation | Significance of residual effect (significance) |
|-------------------------------------|----------------------|---------------------|-------------------------------|--|---------------------------------------|----------------------------------|--|
| Offshore Project | Puffin | Negligible | High | M025 | Minor (Not Significant) | | Minor (Not Significant) |
| | Red-throated diver | Negligible | Very high | M031 M033 | Minor (Not Significant) | | Minor (Not Significant) |
| | Great northern diver | Negligible | High | M036 | Minor (Not Significant) | | Minor (Not Significant) |
| | Gannet | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |
| Collision and displacement combined | Kittiwake | Negligible | High | M001 M004 | Minor (Not Significant) | None required | Minor (Not Significant) |
| | Gannet | Negligible | High | M005 M014 M016 M018 M019 M022 M025 M031 M033 M036 | Minor (Not Significant) | | Minor (Not Significant) |
| Barrier effect | Fulmar | Negligible | High | M001 M014 | Minor (Not Significant) | None required | Minor (Not Significant) |
| | Migratory birds | Negligible | High | M018 M019 | Minor (Not Significant) | None required | Minor (Not Significant) |

| Activity and impact | Receptor | Magnitude of impact | Receptor sensitivity or value | Embedded mitigation measures | Significance of effect (significance) | Further environmental mitigation | Significance of residual effect (significance) |
|--|-------------------------|---------------------|-------------------------------|------------------------------|---------------------------------------|----------------------------------|--|
| | | | | M033 M036 | | | |
| Long-term habitat loss (i.e. duration of the Offshore Project) | Kittiwake | Negligible | High | M001 M002 | Minor (Not Significant) | Non required | Minor (Not Significant) |
| | Great black-backed gull | Negligible | High | M004 M005 M018 | Minor (Not Significant) | | Minor (Not Significant) |
| | Herring gull | Negligible | High | M019 | Minor (Not Significant) | | Minor (Not Significant) |
| | Arctic tern | Negligible | High | M022 | Minor (Not Significant) | | Minor (Not Significant) |
| | Guillemot | Negligible | High | M025 | Minor (Not Significant) | | Minor (Not Significant) |
| | Razorbill | Negligible | High | M031 | Minor (Not Significant) | | Minor (Not Significant) |
| | Puffin | Negligible | High | M033 | Minor (Not Significant) | | Minor (Not Significant) |
| | Red-throated diver | Negligible | High | M036 | Minor (Not Significant) | | Minor (Not Significant) |
| | Great northern diver | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |
| | Fulmar | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |
| Manx shearwater | Negligible | High | | Minor (Not Significant) | Minor (Not Significant) | | |

| Activity and impact | Receptor | Magnitude of impact | Receptor sensitivity or value | Embedded mitigation measures | Significance of effect (significance) | Further environmental mitigation | Significance of residual effect (significance) |
|--|----------------------|---------------------|-------------------------------|------------------------------|---------------------------------------|----------------------------------|--|
| | Gannet | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |
| Response to artificial lighting | Fulmar | Negligible | High | M014 | Minor (Not Significant) | None required | Minor (Not Significant) |
| | Manx shearwater | Negligible | Low | M016 M019 | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Storm petrel | Negligible | Medium | M022 M025 | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Leach's petrel | Negligible | High | M031 M033 | Minor (Not Significant) | | Minor (Not Significant) |
| Decommissioning Phase | | | | | | | |
| Temporary habitat loss and disturbance | Kittiwake | Negligible | Low | M004 M010 | Negligible (Not Significant) | None required | Negligible (Not Significant) |
| | Guillemot | Negligible | Medium | M014 M018 | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Razorbill | Negligible | Low | M020 M022 | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Puffin | Negligible | Medium | M031 M033 | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Red-throated diver | Low | High | | Minor (Not Significant) | | Minor (Not Significant) |
| | Great northern diver | Negligible | Medium | | Negligible (Not Significant) | | Negligible (Not Significant) |

| Activity and impact | Receptor | Magnitude of impact | Receptor sensitivity or value | Embedded mitigation measures | Significance of effect (significance) | Further environmental mitigation | Significance of residual effect (significance) |
|--|-------------------------|---------------------|-------------------------------|--|---------------------------------------|----------------------------------|--|
| | Gannet | Negligible | Low | | Negligible (Not Significant) | | Negligible (Not Significant) |
| Indirect effects through effects on prey species | Kittiwake | Negligible | High | M004 M010 M014 M018 M020 M022 M031 M033 | Minor (Not Significant) | None required | Minor (Not Significant) |
| | Great black-backed gull | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |
| | Herring gull | Negligible | Low | | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Arctic tern | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |
| | Guillemot | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |
| | Razorbill | Negligible | Medium | | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Puffin | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |
| | Red-throated diver | Negligible | High | | Minor (Not Significant) | | Minor (Not Significant) |
| | Great northern diver | Negligible | Medium | | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Fulmar | Negligible | Medium | | Negligible (Not Significant) | | Negligible (Not Significant) |
| Manx shearwater | Negligible | Medium | Negligible (Not Significant) | Negligible (Not Significant) | | | |

| Activity and impact | Receptor | Magnitude of impact | Receptor sensitivity or value | Embedded mitigation measures | Significance of effect (significance) | Further environmental mitigation | Significance of residual effect (significance) |
|---------------------------------|-----------------|---------------------|-------------------------------|------------------------------|---------------------------------------|----------------------------------|--|
| | Gannet | Negligible | Medium | | Negligible (Not Significant) | | Negligible (Not Significant) |
| Response to artificial lighting | Fulmar | Negligible | High | M004 | Minor (Not Significant) | None required | Minor (Not Significant) |
| | Manx shearwater | Negligible | Low | M010 M014 M018 | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Storm petrel | Negligible | Medium | M020 M022 | Negligible (Not Significant) | | Negligible (Not Significant) |
| | Leach's petrel | Negligible | High | M031 M033 | Minor (Not Significant) | | Minor (Not Significant) |

Table 14.86 Summary of residual effects for the Offshore Project cumulatively with other plans and projects

| Activity and impact | Receptor | Magnitude of impact | Receptor sensitivity or value | Embedded mitigation measures | Significance of effect (significance) | Further environmental mitigation | Significance of residual effect (significance) |
|--|-------------------------|---------------------|-------------------------------|--|---------------------------------------|----------------------------------|--|
| Operation and maintenance | | | | | | | |
| Collision risk | Kittiwake | Negligible | High | M014 | Minor | None required | Minor |
| | Great black-backed gull | Negligible | Very high | M016 M019 M022 | Minor | | Minor |
| | Arctic tern | Negligible | High | M025 | Minor | | Minor |
| | Gannet | Negligible | High | M033 | Minor | | Minor |
| Distributional responses (displacement) associated with the Offshore Project | Kittiwake | Negligible | High | M001 | Minor | None required | Minor |
| | Razorbill | Negligible | Medium | M004 M005 | Negligible | | Negligible |
| | Puffin | Negligible | High | M014 | Minor | | Minor |
| | Gannet | Negligible | High | M018 M019 M022 M025 M031 M033 M036 | Minor | | Minor |

| Activity and impact | Receptor | Magnitude of impact | Receptor sensitivity or value | Embedded mitigation measures | Significance of effect (significance) | Further environmental mitigation | Significance of residual effect (significance) |
|-------------------------------------|--------------------|---------------------|-------------------------------|--------------------------------------|---------------------------------------|----------------------------------|--|
| Collision and displacement combined | Kittiwake | Negligible | High | M001 | Minor | None required | Minor |
| | Red-throated diver | Negligible | High | M014 M018 M019 | Minor | | Minor |
| | Gannet | Negligible | High | M022 M025 M031 M033 M036 | Minor | | Minor |

14.16 GLOSSARY OF TERMS AND ABBREVIATIONS

14.16.1.1 A list of key terms and acronyms used in this chapter are provided in Table 14.87 and Table 14.88.

Table 14.87 Acronyms and abbreviations

| Term | Definition |
|--------|---|
| AEWA | Agreement on the Conservation of African-Eurasian Migratory Waterbirds |
| BDMPS | Biologically Defined Minimum Population Scales |
| BoCC | Birds of Conservation Concern |
| BTO | British Trust for Ornithology |
| CEA | Cumulative Effect Assessment |
| CEMP | Construction Environmental Management Plan |
| CGR | Counterfactual of Growth Rate |
| CPS | Counterfactual of Population Size |
| CRM | Collision Risk Modelling |
| DAS | Digital Aerial Survey |
| DEFRA | Department for Environment, Food & Rural Affairs |
| EEA | European Economic Area |
| EIA | Environmental Impact Assessment |
| EIAR | Environmental Impact Assessment Report |
| ESAS | European Seabirds at Sea |
| ES | Environmental Statement |
| EU | European Union |
| FAME | Future of the Atlantic Marine Environment |
| GPS | Global Positioning System |
| GT | Gross Tonne |
| HDD | Horizontal Directional Drill |
| HPAI | Highly Pathogenic Avian Influenza |
| HRA | Habitat Regulations Appraisal |
| IALA | International Association of Marine Aids to Navigation and Lighthouse Authorities |
| ICES | International Council for the Exploration of the Sea |
| IEF | Important Ecological Feature |
| IMO | International Maritime Organization |
| JNCC | Joint Nature Conservation Committee |
| LSE | Likely Significant Effect |
| MARPOL | International Convention for the Prevention of Pollution from Ships |
| mCRM | Migratory Collision Risk Modelling |
| MD-LOT | Marine Directorate Licencing Operations Team |
| MDS | Maximum Design Scenario |
| MHWS | Mean High Water Spring |

| Term | Definition |
|-------|--|
| MRSea | Marine Renewables Strategic Environmental Assessment |
| MPCP | Marine Pollution Contingency Plan |
| MSL | Mean Sea Level |
| NBN | National Biodiversity Network |
| NEEOG | North East and East Ornithology Group |
| NSVMP | Navigational Safety and Vessel Management Plan |
| OCAS | The Offshore Cable Area of Search |
| OEMP | Offshore Environmental Management Plan |
| OSP | Offshore Substation Platform |
| OWF | Offshore Wind Farm |
| O&M | Operation and Maintenance |
| PAC | Preliminary Application Process |
| PEMP | Project Environmental Monitoring Programme |
| PVA | Population Viability Analysis |
| RSPB | Royal Society for the Protection of Birds |
| SAC | Special Area of Conservation |
| sCRM | Stochastic Collision Risk Model |
| SD | Standard Deviation |
| SDM | Species Distribution Model |
| SMP | Seabird Monitoring Programme |
| SNCB | Statutory Nature Conservation Body |
| SOPEP | Shipboard Oil Pollution Emergency Plans |
| SPA | Special Protection Area |
| SSSI | Site of Special Scientific Interest |
| STAR | Seabird Tracking and Research |
| TJB | Transition Joint Bay |
| UK | United Kingdom |
| VMP | Vessel Management Plan |
| VOR | Valued Ornithological Receptor |
| Zol | Zone of Influence |

Table 14.88 Glossary

| Term | Meaning |
|------------|---|
| Array Area | The offshore area within which the offshore wind turbine generators (WTGs), associated foundations, Offshore Cables, and Offshore Substation Platform (OSP) (if required), will be located. This area encompasses the Turbine Area that will contain all above water surface infrastructure (WTGs / OSP) and an additional area within which further below water infrastructure (foundations and cables) may also be located. |

| Term | Meaning |
|--|---|
| Array Cables | The offshore electrical and communication cables that connect infrastructure located within the Array Area, for: <ul style="list-style-type: none"> • Scenario 1: Array Cables will used to connect Wind Turbine Generators (WTGs) to each other, and to connect WTGs to the OSP. • Scenario 2: Array Cables will used to connect WTGs to each other. |
| Array Cables to Landfall | The offshore electrical and communication cables located in the Array Area and Offshore Cables Area of Search that connect the wind turbine generators (WTGs) directly to Landfall for Scenario 2. |
| the Applicant | Spiorad na Mara Limited (the Project owner) |
| Avoidance | Probability that a bird takes successful evasive action to avoid collision with a turbine. |
| Biologically Defined Minimum Population Scales | The smallest spatial region for which a biologically distinct population of a given species can be defined. The population present may vary between biological seasons. |
| Collision risk | Risk of a bird lethally colliding with a wind turbine within a wind farm. |
| Confidence Interval | A confidence interval displays the probability that a parameter will fall between a pair of values around the mean. |
| Combined Effects | Combined effect of the individual development on one particular receptor; for example noise, dust and visual. This includes Project-Lifetime Effects and Receptor-Led Effects |
| Cumulative effects | Considers the likely significant effects of multiple impacts and activities from several developments. |
| Design-based Abundance Estimates | An estimated total abundance of birds within a given area. The design-based method is based on the premise that the portion of the study area that is surveyed is representative of the remainder of the study area. |
| Disturbance sensitivity | Disturbance by wind farm structures, ship and helicopter traffic factor used scores from 1 (limited escape behaviour and a very short flight distance when approached), to 5 (strong escape behaviour, at a large response distance). |
| Effect | Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria. |
| EIA | A statutory process by which the likely significant effects of certain projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Regulations, including the publication of an EIA report. |
| EIA Regulations | The regulations that apply to this project are the Electricity Works (EIA) (Scotland) Regulations 2017, the Marine Works (EIA) (Scotland) Regulations 2017, the Marine Works (EIA) Regulations 2007, and the Town and Country Planning (EIA) (Scotland) Regulations 2017. |

| Term | Meaning |
|---|---|
| Environmental Impact Assessment Report (EIAR) | The Environmental Impact Assessment Report (EIAR) prepared to assess the likely significant effects of the Project on the environment. |
| Export Cables | The offshore electrical and communication cables located in the Array Area and Offshore Cables Area of Search that connect the Offshore Substation Platform (OSP) (if required) to Landfall for Scenario 1. |
| Embedded or 'Designed-in' Mitigation | Mitigation measures to avoid or reduce environmental effects that are directly incorporated into the preferred design for the Project. This can include standard practice in accordance with or without guidance. Embedded mitigation is considered as part of the impact assessment, before effect significance is identified. |
| Horizontal Directional Drill (HDD) | A trenchless crossing engineering technique using a drill steered underground without the requirement for open trenches. This method is able to carry out the underground installation of pipes and cables with minimal surface disruption. |
| Habitat Regulations Appraisal | A process which helps determine likely significant effects and (where appropriate) assesses adverse effects on the integrity of European conservation sites and Ramsar sites (when these are also an SPA or SAC). The process consists of a multi stage assessment which incorporates screening, appropriate assessment, assessment of alternative solutions and assessment of imperative reasons of over-riding public interest (IROPI) and compensatory measures. |
| Habitat specialisation | The habitat specialisation factor represents the range of habitats species are able to use and whether they use these as specialists or generalists. This score classifies species into categories from 1 (tend to forage over large marine areas with little known association with particular marine features) to 5 (tend to feed on very specific habitat features, such as shallow banks with bivalve communities, or kelp beds). |
| Impact | Change that is caused by an action; for example, land clearing (action) during construction which results in habitat loss (impact). |
| Landfall | This consists of works from offshore Horizontal Directional Drill (HDD) exit pits (located below MLWS) to onshore at the Transition Joint Bays (TJB) (located above MHWS). The infrastructure and installation methods associated with the Landfall involves both onshore and offshore components. |
| Landfall Substation | The optional onshore substation located on the west side of the Isle of Lewis/ <i>Eilean Leòdhais</i> . Includes the platform, buildings and associated components which allows the voltage to be increased to meet onward transmission requirements. |
| Mitigation | Term used to indicate avoidance, remediation or alleviation of adverse impacts. |
| MRSea | The 'Marine Renewables Strategic Environmental Assessment' statistical package for R to model spatial count data and predict spatial abundances. This package has been developed by the Centre for Research into Ecological and Environmental Modelling (CREEM) |

| Term | Meaning |
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| | specifically for dealing with data collected for marine renewable projects. |
| NatureScot | NatureScot is the lead public body responsible for Scotland's natural environment. |
| Offshore Cables | Electrical and communication cables located within the Array Area and Offshore Cable Area of Search. The Offshore Cables consist of Array Cables, Array Cables to Landfall, and Export Cables. |
| Offshore Cable Area of Search (OCAS) | The area within which the offshore electrical and communication cables between the Array Area and Landfall up to Mean High Water Springs (MHWS) will be located. |
| Offshore Project | The components of the Sporad na Mara offshore wind farm (the Project) located seaward of Mean High Water Springs (MHWS). |
| Offshore Project Boundary | The 'red line boundary' encompassing the Offshore Project. |
| Offshore Substation Platform (OSP) | The optional offshore substation located within the Turbine Area. Includes the platform and associated components which allows the voltage to be increased to meet onward transmission requirements. |
| Ornithology | The study of birds, their behaviour, physiology and taxonomy. |
| Other Ornithological Receptors | Refers to migratory seabirds and waterbirds screened into the assessment |
| Population Viability Analysis | Population modelling to predict future trends and population estimates for a range of input scenarios. |
| Project | The Sporad na Mara offshore wind farm development. This term describes the whole development, including all offshore and onshore components. |
| Project Boundary | The 'red line boundary' encompassing all offshore and onshore components of the Project. |
| Project Design Envelope | A description of the range of possible components that make up the Project design options under consideration when the exact engineering parameters are not yet known. |
| Project-Lifetime Effects | Assessment of the scope for combined effects that occur throughout more than 1 phase of the project (i.e. construction, operation and maintenance, decommissioning), to interact to potentially create an effect of greater significance than if assessed just within individual/isolated project phases |
| Receptor | Any physical, biological or anthropogenic element of the environment that may be affected or impacted by the Project. Receptors can include natural features such as the seabed and wildlife habitats as well as man-made features like fishing vessels and cultural heritage sites. |
| Receptor-Led Effects | Assessment of the scope for all combined effects to interact, spatially and temporally, to create an effect on a receptor of greater significance than when the effects are considered in isolation. Receptor-led effects may be short term, temporary or transient effects, or incorporate longer term effects. |

| Term | Meaning |
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| Red list | A "red list" bird of conservation concern is a species that is of greatest concern for conservation, based on criteria such as severe population or range declines. The BTO uses this system to categorise species based on their conservation status. |
| Scoping Opinion | A report presenting the written opinion of the Scottish Ministers, with input from Comhairle nan Eilean Siar (CnES) for the Onshore Project, as to the scope and level of detail of information to be provided in the Environmental Impact Assessment (EIA) for the Project. |
| Seabird | Bird species that is ecologically dependent on the marine environment for at least part of its life cycle. Seabirds typically forage at sea and may nest on coastal cliffs, islands, or beaches. Examples include gannets, puffins, kittiwakes, and shearwaters. |
| Season | Bird behaviour is recognised to differ across a calendar year, with particular months recognised as being part of different seasons. Defined seasons allow for assessment to be carried out using season-specific methodology and assessed against the population present within that season. |
| Study Area | The area in which impacts resulting from the Offshore Project are most likely to occur. This is defined as the Turbine Area plus a 4 km buffer around the Turbine Area, up to MHWS (i.e. excluding any land within 4 km of the Turbine Area). Note that consideration is given to connectivity with mobile receptors and protected sites beyond the Study Area. |
| Survey Area | The area within which a given survey was undertaken in order to obtain baseline information. This is the Array Area plus a 10 km buffer, up to MHWS (i.e. excluding any land within 10 km of the Array Area). |
| Transition Joint Bay (TJB) | The point at which offshore cables are connected to Onshore Cables. The TJB is located onshore above MHWS. |
| Turbine Area | A reduced area within the Array Area where above water surface infrastructure would be located i.e. wind turbines or Offshore Substation Platform (OSP). Developed and refined through environmental assessment. |
| Waterbird | Bird species that is ecologically dependent on wetlands, freshwater bodies, or coastal habitats for feeding, breeding, or roosting. This group includes species such as ducks, geese, swans, waders, and herons. While some waterbirds may use marine environments, they are generally more associated with inland or coastal waters than with open sea areas. |

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