

Addendum to the
Environmental Impact
Assessment Report

NISA
North Irish Sea Array

Volume 3 - Offshore Chapters

Chapter 15

Offshore Ornithology



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15. Offshore and Intertidal Ornithology

15.1 Introduction

North Irish Sea Array Windfarm Ltd (NISA, hereafter referred to as ‘the Developer’) has been considering the Request for Further Information (RFI) issued by An Bord Pleanála (now An Coimisiún Pleanála) as well as the third-party submissions received following public consultation. At An Coimisiún Pleanála’s behest, the Developer has also continued to consult with stakeholders in respect of the 2024 planning application throughout 2024-2026. The Developer has refined elements of the design to respond to the third-party submissions, the continued public and stakeholder consultation and the RFI. Amendments are therefore required to Chapter 15 Offshore Ornithology Environmental Impact Assessment Report (EIAR). Full details of consultation undertaken can be found in Appendix A.1.2: Addendum to the EIAR.

For the purpose of clarity, this document shall be read in conjunction with Chapter 15 of the 2024 EIAR.

Any cross reference to a chapter, section, table, image, figure or appendix within this document is to another location within Appendix A.1.2: Addendum to the EIAR unless explicitly stated otherwise. Any cross reference to anything included in the 2024 EIAR will be clearly labelled as such.

Text in bold is only used throughout this document to indicate where changes are required, and why they are required. Text in italics is text from a section of the 2024 EIAR which is deleted, or quotations from other documents (as explicitly stated). Replacement text is in normal font.

Tables which have been updated from the 2024 EIAR, or entirely new tables, have been included in Appendix A.1.2: Addendum to the EIAR. These can be identified by the “A” prefix in the caption. Any changes within an updated table, in comparison to tables within the 2024 EIAR, are indicated by grey shading in the relevant cell, column or row, as necessary. The exception to this is when a table has changed in its entirety.

The sections relevant to Chapter 15 in the RFI are included below.

Table A15.1 RFI submissions from the An Coimisiún Pleanála relevant to the Ornithology EIAR and cross reference to the sections in which they are addressed

| RFI Section | RFI | Relevance to Chapter |
|-------------|--|---|
| 1b | The scientific information provided as part of the planning application documentation should be based on up-to-date survey reports and data. Accordingly, the applicant is requested to confirm/provide justification/verification that the information submitted in support of the planning application remains relevant and appropriate at the point of submitting further information or to update same as required. | The timeframes associated with the RFI have necessitated a review of the datasets previously used in the 2024 EIAR to ensure any necessary updates to the baseline environment are captured. This addendum to Chapter 15 ensures that the assessment remains valid and representative of up to date information. |
| 1c | The applicant is requested to confirm whether any on-going or additional surveying has been carried out since the application was lodged and, if so, the applicant is invited to submit any further survey data results and analysis and update the planning application documentation, as appropriate. | Additional ornithological surveys have been undertaken since submission of the Application. These additional surveys are described in Section 15.2.5. |
| 4 | <p>The documentation submitted does not provide specific detail, assessment, or review of the range of ecosystem functions and services which could be impacted by the proposed development. The National Marine Planning Framework (NMPF) states that proposals to protect, maintain, restore, and enhance coastal habitats for ecosystem functioning and provision of ecosystem services will be supported, subject to the outcome of statutory environmental assessment processes. Seafloor and Water Column Integrity Policy 3 of the NMPF also requires proposals to take account of the space required for coastal habitats, for ecosystem functioning and the provision of ecosystem services and to demonstrate that they will, in order of preference, avoid, minimise or mitigate for net loss of coastal habitats.</p> <p>The applicant is requested to update the EIAR to include an assessment of impacts (both positive and negative) on relevant ecosystem functions and services and include mitigation measures, as appropriate. The applicant is also requested to submit a synopsis report of the relevant impacts on ecosystem functions and services. In identifying the relevant ecosystem services for assessment, including those services classified as provisioning, regulation and maintenance, and cultural services, the applicant is advised to consider the full range of ecosystem services set out in the report ‘Valuing Ireland’s Blue Ecosystem Services’ (SEMRU of NUI Galway, 2018), as referenced in the NMPF. The report should also consider the need for an adaptive management framework for ongoing assessment and should include provision for appropriate monitoring of any mitigation measures and operational management strategies, as well as provision for decommissioning.</p> | <p>The Developer has not revised assessments in the respective Chapters of the EIAR as the conclusions of the EIAR are already directly linked to the assessment of ecosystem functions and services. This includes assessment of decommissioning impacts, the need for adaptive management, ongoing monitoring and/or other mitigations.</p> <p>The Developer has updated the Seafloor and Water Column Integrity Policy 3 in the addendum to the National Marine Planning Framework Compliance Report to provide more information to respond to RFI Section 4 (Appendix A3.1).</p> <p>A synopsis report of ecosystem functions and services has been provided in Appendix A3.3 Ecosystem Functions and Services Assessment. The outcome of individual receptor assessments, concluded no material impact on ecosystem services, and no impediment to the ability of normal ecosystem functions and services to function, resulting from the proposed development.</p> |
| 5 | <p>The Board notes that cumulative assessment was addressed under each topic specific chapter in the EIAR and addressed within Chapter 38 Cumulative and Interrelated Effects Assessment (CEA) (and associated Appendices 38.1 and 38.2).</p> <p>The Marine Institute in their observation raises concerns in relation to the methodology applied in the submitted cumulative effects assessment and the manner in which the information is presented, noting the lack of a standard Irish methodology in relation to CEA.</p> | The cumulative effects assessment has been revised in line with NSIP (Note: the 2024 Guidance was last updated in March 2025) and relevant sections of Chapter 15: Offshore Ornithology have been updated. |

| RFI Section | RFI | Relevance to Chapter |
|-------------|--|---|
| | <p>The applicant is advised that guidance exists in the UK, namely Nationally Significant Infrastructure Projects: Advice on Cumulative Effects Assessment - GOV.UK, September 2024 (NSIP, 2024). The applicant is requested to revise the submitted cumulative assessment in line with NSIP (2024) and submit a standalone document to clearly demonstrate the CEA conclusions. In the interests of consistency and transparency, the applicant is requested to complete the assessment in accordance with the templates provided in the NSIP (2024), namely “Appendix 1: Matrix 1 – Identification of ‘other development’ for CEA” and “Appendix 2: Matrix 1 – Assessment matrix” (see attached Appendix B). This assessment should include each of the Irish Sea Phase 1 ORE Projects, namely (Oriel WF (ABP-319799-24), Arklow WF (ABP-319864-24), Codling Wind Park (ABP-320768-24), and Dublin Array WF (ABP-321992-25), and all other relevant projects in the International Council for the Exploration of the Sea (ICES) Celtic Sea and Greater North Sea ecoregions, regardless of project type. It is further requested that the applicant confirm that the now published documentation pertaining to the Irish Sea Phase 1 ORE projects, which have all been submitted to the Board for planning consent since this application was submitted, have been fully incorporated into the cumulative effects assessment.</p> <p>In accordance with NSIP (2024) tiered approach, it is requested that the subject proposal and each of the Irish Sea Phase 1 ORE projects be classified under Tier 1 (“Other existing and, or approved development submitted applications under the Planning Acts or other regimes but not yet determined”).</p> <p>The applicant is requested to update the application documentation, where relevant.</p> <p>In the interests of comprehensiveness and for ease of reference, the applicant is strongly encouraged to liaise with the other Irish Sea Phase 1 ORE Project applicants in the preparation of the above assessment and drafting of the tables attached in Appendix B.</p> | |
| 8ai | <p>Roseate Tern: Perrow et al. (2019) studied the at-sea foraging distribution of the Rockabill colony over one breeding season (2018), showing the species uses the nearby proposed array area. The EIAR discusses tracking data from Perrow et al. (2019) in the Technical Baseline (Appendix 15.1), however, unlike the accounts of other species, the relevant section of the EIAR appendix does not provide a summary figure of the Roseate Tern tracking data. Considering the importance of the area to Roseate Tern, available data should be considered in further detail and used to inform the assessment. The applicant is requested to present the information provided by Perrow et al. (2019) in the technical baseline and to consider the tracking data when assessing potential impacts to Roseate Tern.</p> | <p>The Developer notes An Coimisiún Pleanála’s comments regarding the inclusion and use of roseate tern tracking data at Rockabill SPA from Perrow et al. (2019). A figure has not been included as the underlying tracking data were not available to the Developer for reproduction. However, the study has been reviewed and is cited in the Technical Baseline (Appendix A15.1 Offshore and Intertidal Ornithology Technical Baseline). Its findings on the spatial use of waters around the array area have informed the assessment (see Section 15.5.3.2).</p> <p>In the absence of raw data, no further analysis was possible; however, the assessment is based on the best available evidence, including Perrow et al. (2019), and is not prejudiced by this limitation.</p> <p>In addition, 12 additional months of North West Irish Sea (NWIS) Digital Aerial Survey (DAS) data (NWIS DAS), which recorded Roseate tern within the breeding season and in July, thereby providing greatly expanded spatial and temporal coverage of usage within and around the array area.</p> |

| RFI Section | RFI | Relevance to Chapter |
|-------------|---|--|
| | | Collision risk modelling has been re-run using the expanded dataset and updated Collision Risk Model (CRM) parameters, delivering a more comprehensive and precautionary assessment. The updated Roseate tern results are presented in Section 15.5.3.2 (with supporting detail in the Appendix A15.3: Offshore Ornithology Collision Risk Modelling Assessment). |
| 8a.ii. | <p>Red-throated Diver: The desktop review summarised in Table 15.3 of Chapter 15 of the EIAR does not appear to include the results generated from a series of Digital Aerial Surveys (DAS) undertaken over marine waters off Gormanstown (HiDef, 2019) that was commissioned by the Marine Institute and referenced in the National Parks and Wildlife Service (NPWS) Conservation Objective document for the NWIS cSPA. This survey data indicates a high density of Red-throated Diver <i>Gavia stellata</i> in the area of the coast west of the array, and overlapping with the proposed cable route. Densities were notably larger than those densities that informed the applicant’s assessment of mortality caused by displacement-disturbance effects for this proposed development (i.e. 3.26 individualskm⁻² on 29/12/2018; 1.35 individualskm⁻² on 16/01/19; 3.45 individualskm⁻² on 04/02/19; 2.99 individualskm⁻² on 23/03/19).</p> <p>As well as being important for assessment of Red-throated Diver, the HiDef/Gormanstown 2019 surveys are also likely to be relevant for the assessment of other species that the applicant is requested to reconsider (e.g. Great Northern Diver <i>Gavia immer</i>, Common Scoter).</p> <p>As such, the applicant is requested to include the HiDef/Gormanstown 2019 survey data in the assessment of impacts on the marine birds of the NWIS cSPA in relation to this proposed development, including in the assessment associated with the cable route. The applicant is requested to review the EIAR and NIS accordingly.</p> | The Developer has undertaken a more recent and extensive DAS campaign over 12 months which has >16% coverage of the NWIS CSPA and >18% coverage within the 10km displacement buffer. This data is considered more comprehensive than the HiDef 2019 data, and therefore now forms the main basis of the assessment. Details on the assessment of red-throated diver are presented in Section 15.5.2.1. Full details of the additional DAS campaign can be found in Appendix A15.1: Offshore and Intertidal Ornithology Technical Baseline. |
| 8a.iii. | <p>Red-throated Diver is a species known to be highly sensitive to offshore wind farm developments due to displacement effects. A 4km displacement buffer is applied in the application documentation. The Board note that for Red-throated Diver best available evidence as presented in the UK Joint SNCB ‘Interim Advice On The Treatment Of Displacement For Red-Throated Diver’ (SNCB, 2022) states that:</p> <p>“For non-breeding red-throated diver, a pragmatic displacement buffer of at least 10km is recommended for use in site characterization, impact assessments and post-consent monitoring where a plan or project is within 10km of a Special Protection Area (SPA) designated for non-breeding redthroated diver. Where a plan or project is further than 10km from a SPA designated for non-breeding red-throated diver, a standard displacement buffer of 4km should continue to be used”.</p> | <p>The Developer has now undertaken an assessment of displacement impacts on red-throated diver in the Projected Footprint of Infrastructure (PFI) and a surrounding 10km buffer, as presented in Section 15.5.2.1 and 15.5.3.1.</p> <p>The additional DAS campaign (see 8a.ii.) covered the full NWIS cSPA on a monthly basis between September 2024 and August 2025, providing comprehensive coverage of the PFI +10km buffer and the Export Cable Corridor (ECC) +2km buffer. This provides a more recent and robust dataset from which to assess impacts to red-throated diver and other relevant species.</p> |

| RFI Section | RFI | Relevance to Chapter |
|-------------|--|---|
| | <p>The DAU in their observation identifies the following papers which further indicate displacement impacts of greater than 4km for Red-throated Diver: Heinänen et al. (2016); Žydelis et al. (2016); Webb et al. (2017); Mendel et al. (2019); Heinänen et al. (2020); Vilela et al. (2020); and APEM (2021).</p> <p>The Board notes that the proposed development is located entirely within the NWIS cSPA, for which Red-throated Diver is a SCI, and given the evidence sources available, the Board requests that the applicant reconsiders screening out displacement effects on Red-throated Diver associated with the array area.</p> <p>The information available from HiDef (2019) surveys indicates the known extent of Red-throated Diver and their densities and shows the species concentrating in shallower coastal areas. This therefore provides an evidence base for waters of 5-20m; however, the species can also use water depths up to 30m (Natural England, 2012). There appears to be a data gap between the HiDef survey boundary and the array area boundary. The applicant is requested to overlay the application survey maps with the HiDef survey maps and, where there is a data gap, the applicant is requested to undertake additional survey work to address the data gap. The survey should provide sufficient coverage to reliably characterise the distribution and abundance of Red-throated Diver from the proposed array area western boundary to a distance of 10km towards the coast (west).</p> <p>The applicant is requested to assess displacement of Red-throated Diver to a distance of at least 10km from the proposed array area due to project infrastructure, having regard to recent best available evidence as presented in the UK Joint SNCB Interim Displacement Advice Note (SNCB, 2022), and update the EIAR and NIS accordingly.</p> <p>Note: Due to the water depth within the array area and low numbers of Red throated Diver observed in the existing DAS (May 2020 to October 2022), two full winter seasons may not be required to be surveyed to address any data gap, where it is detected. It is requested that the applicant considers undertaking targeted surveys covering one winter period, with two surveys per month undertaken in critical months for wintering Red-throated Diver. This would comprise one survey per month to be undertaken in November and December; two surveys per month in each of January, February, and March, and one survey to be undertaken in April.</p> | |
| 8aiv. | <p>Migratory Waterbirds: Chapter 15 of the EIAR, and NIS Appendix 19 Offshore and Intertidal Ornithology Migration Collision, address migratory waterbird species.</p> <p>The DAU notes that a significant number of migratory waterbirds (in terms of species and absolute numbers) migrate to and from Ireland across the Irish Sea. The DAU observation raises concerns in relation to the lack of sufficient collection of spatially relevant field data at key migration times (i.e. spring and autumn) in the EIAR, combined with the acknowledged low confidence levels applied in relation to avoidance rates in the migratory Collision Risk Modelling (mCRM) Tool.</p> | <p>The Developer has undertaken an updated assessment on migratory waterbirds using a bespoke modelling specific to Irish bird populations, detailed in Appendix A15.4: Offshore Ornithology Migratory Collision Risk Modelling: Irish East Coast Phase One Offshore Wind Projects Cumulative Assessment, with outputs presented in Section 15.5.3.4 of this chapter.</p> |

| RFI Section | RFI | Relevance to Chapter |
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| | <p>The DAU states the information submitted is insufficient to assess the migratory movements of birds through the development area. The DAU has concerns that the proposed development has the potential to have significant impacts upon migratory waterbirds and the Conservation Objectives of the SPAs for which they are listed. The DAU recommends that the applicant develops and implements more appropriate survey methodologies to detect and robustly characterise and assess the level of bird migration through the proposed development area, working collectively with the other Irish Sea ORE applicants.</p> <p>The Board notes the Vantage-point survey results submitted by the applicant have spatial limitations in terms of robustness and have not been used in quantifiable assessments. There is also limited information on flux or passage of birds through the proposed array area itself during migration (east-west and north-south). The data query is only partially filled by the applicant's approach to assessing collision risk, where GIS and straight-lines have been applied to identify potential migration pathways/flight routes to assess the proportion of flights (as a proxy for population) which may pass through the proposed array area.</p> <p>Having reviewed all the information presented, the Board requests that further assessment is carried out regarding impacts to migratory species. The applicant is requested to address the purported data gap relating to migratory birds to enable the assessment of potential impacts of the proposed development. Radar (horizontal and vertical surveys) (or similar) at the array area during peak migration periods should be utilised to provide site-specific data, which could be used to support the applicant's current assessment and provide quantitative information on passage of birds to feed into collision modelling. Should radar not be conducted and an alternative survey methodology utilised, comprehensive justification for the alternative should be provided. Peak migration periods during which data are to be collected can be further informed through review of existing data and published literature relevant to the project area and region. Whilst the DAU makes reference to the key migration times being spring and autumn, the Board considers that migration information during the winter months would also be of assistance to the assessment (e.g. irruptive cold weather movements from the continent and UK). The applicant is invited to consider this aspect for inclusion also.</p> <p>The applicant should note reliance on literature to fill knowledge gaps, while useful, does not provide adequate data to ensure a comprehensive assessment of potential effects on birds.</p> | <p>Likewise, the Developer has collected additional Vantage-point (VP) and Passive Acoustic Monitoring (PAM) data in autumn 2024 and 2025 (Appendix A15.7: Migratory Bird Survey Report 2026) which has been presented to DAU and used to inform the migratory bird assessment (Section 15.5.3.4).</p> <p>Radar was considered but not utilised due to a number of technical and logistical reasons. While radar and other specialised survey techniques can provide general movement data, they do not reliably identify birds to species level, nor do they robustly characterise species-specific flight heights or behaviours required for quantitative CRM. Given the dispersed nature of migration across the Irish Sea, the absence of narrow, high-density migration fronts, and the inherently precautionary nature of the modelling applied, radar-based surveys would not meaningfully reduce uncertainty or alter the assessment conclusions.</p> <p>The Developer therefore considers that the existing empirical data, enhanced by additional VP and PAM surveys, together with the cumulative Irish-centric mCRM, provide a robust and proportionate evidence base for the assessment. Further site-specific migration surveys, including radar, would be unlikely to materially change the findings or improve the assessment of potential impacts on migratory waterbirds.</p> |
| 8av. | <p>Terrestrial Bird Species: The DAU considers there to be deficiencies in the assessment of land-based avifauna, with CRM data based on general assumptions. The DAU recommends additional data and consideration of survey/monitoring options such as targeted deployment of passive acoustic devices at headlands and offshore nocturnal boat transects; review of available ringing/tracking data for migratory species and/or species which are known/likely to conduct staging/dispersal movement; and thermal imaging devices (hand-held/drone) surveys targeted at likely peak periods of passage.</p> | <p>The Developer has undertaken a detailed assessment of terrestrial bird species that may pass through the proposed development on migration. This assessment, and relevant species, are detailed in Appendix A15.4 with outputs presented in Section 15.5.3.4 of this Addendum.</p> |

| RFI Section | RFI | Relevance to Chapter |
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| | The Board requests that further assessment is carried out regarding impacts on terrestrial bird species. The applicant is requested, having regard to the above comments to address the purported data gap and potential impacts of the proposed development on terrestrial birds. | |
| 8avi. | Baseline Data Vintage: The Board queries the age and relevance of the submitted aerial and boat-based survey data used in the application, in particular considering the 2022 Highly Pathogenic Avian Influenza (HPAI) season, which had significant negative impacts on a range of seabird species. The applicant is requested to provide justification that the original digital aerial surveys and boat-based data remain relevant and appropriate at the point of submitting additional information to support the proposed development. | The assessment presented in this Addendum uses the most up-to-date and comprehensive data available. Further detail is provided in Appendix A15.1: Offshore and Intertidal Ornithology Technical Baseline. |
| 8avii. | <p>Regional Breeding Population: The robustness of population calculations used within Chapter 15 Ornithology, and associated appendices, is important in assessing the potential effects of the proposed development. The Board notes that the EIAR (Chapter 15, Table 15.17 and Appendix 15.1, Table 2.12) presents two methods for estimating regional breeding season populations against which impacts are assessed in the EIAR. Method 1 (applied in the EIAR and used to inform assessment conclusions) involves the number of breeding adults in the breeding season plus the number of immatures in the previous non-breeding season. Method 2 (presented in the EIAR but not used to inform assessment conclusions) applies the ratio of adults to immature birds in the population to the number of breeding adults in the breeding season. The applicant is requested to provide evidence-based justification for applying its chosen method.</p> <p>Method 2 is considered to be the more appropriate and precautionary method to apply for estimating regional breeding season populations and the applicant is requested to use this methodology to inform assessment conclusions. The applicant is requested to clearly present the values and equations used to derive the population estimates, including their sources (e.g. a list of colonies or sites included within the reference populations), to allow validation of the methodology. The applicant is requested to also address this issue in the Cumulative Effects Assessment (CEA) chapter.</p> | <p>The Developer has provided an updated assessment which now only uses Method 2 (exception being Manx shearwater, see Section 15.5.2.1) for the regional breeding population. The calculation of regional breeding season populations are discussed in Section 15.3.2, with the assessment on populations provided in relevant sections of Section 15.5 of this Addendum.</p> <p>The Developer notes, however, that while Method 2 is considered more precautionary overall, it may not be appropriate in all circumstances. In particular, for some species or regions where the estimated breeding population is particularly low, using this method is likely to under-represent immature birds. This limitation is acknowledged in the assessment and has been considered when interpreting the magnitude and significance of effects.</p> <p>When concluding on the significance of effect, more weight was given to the Developer's Approach because it is supported by evidence.</p> |
| 8aix. | Breeding Season of Common Guillemot: The Board does not agree with the applicant's determination that the Irish east coast Common Guillemot <i>Uria aalge</i> breeding season ends at the end of June. The evidence presented by the applicant is based on a study conducted at a colony in Scotland (Dunn, 2020, 2022) and suggests that the breeding season 'ends' around 10 July, although the July DAS were flown on 18 July 2020, 05 July 2021, and 04 July 2022. There are consequences regarding the July period as non-breeding which results in the breeding mean peak count bio season for the proposed array area plus 2km, to be 1,813 (95% Cis 1,258 – 2,385) individuals as opposed to 13,703 (95% Cis 8,940 – 18,414) individuals (see Table 3-1 of Appendix 15 of the EIAR / Appendix 17 of the NIS, Offshore and Intertidal Ornithology Displacement Analysis). This has consequences when apportioning estimated mortality figures arising from displacement impacts to Common Guillemot populations breeding at Lambay Island SPA, Ireland's Eye SPA and others. | <p>The Developer maintains their position that the Furness Approach to breeding season definitions is inappropriate for this particular assessment. Both the Furness Approach and Developer Approach (hereafter: "site-specific approach") to bio-seasons are presented throughout the guillemot assessment. Site-specific approaches to defining bio-seasons based on site-specific data are also presented for razorbill and kittiwake (alongside Furness bio-seasons). These are presented in Section 15.3.2 of this Addendum.</p> <p>Further justification for the site-specific approach has been provided in Appendix A15.1. Patterns in the abundance and distribution of species in the NWIS DAS also confirms the relevance of the site-specific approach.</p> |

| RFI Section | RFI | Relevance to Chapter |
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| | The applicant is requested to apply the UK seasons (Furness, 2015) for Common Guillemot (breeding season: March to July; non-breeding season: August to February), aligning with the approach taken for other species assessed. | |
| 8bi. | The applicant has concluded that several wader species have a low sensitivity to displacement effects citing a study which only looks at seabirds and does not mention these species (Bradbury et al., 2014, 2017). The applicant is requested to provide and cite an appropriate source providing justification for determining waders as having a low sensitivity to disturbance, which should be cited in the submitted documentation or amend the relevant documentation accordingly. | <p>The Developer recognises that Bradbury et al. (2014, 2017) focus primarily on seabird species and are not an appropriate evidence base for assessing disturbance or displacement sensitivity in waders. The reference has therefore been reviewed and updated.</p> <p>Disturbance sensitivity for wader species is now informed by NatureScot guidance and disturbance distances in selected Scottish bird species (NatureScot, 2022), based on an updated review of empirical evidence (Goodship & Furness, 2022).</p> |
| 8ci. | Displacement Methodology: The Board is satisfied that the applicant has used the industry standard Displacement Matrix approach. However, the Board notes that the applicant has based conclusions in relation to displacement on its preferred rates for displacement and mortality of auks and Northern Gannet (50% displacement and 1% mortality for auks, 70% displacement and 1% mortality for Northern Gannet <i>Morus bassanus</i>) instead of on industry recommended rates, and has taken these rates forward to Population Viability Analysis (PVA). The Board queries the applicant's use of preferred rates in relation to auks, due to NISA's close proximity to the coast and to breeding Common Guillemot and Razorbill Alca torda colonies (NWIS cSPA, Lambay Island SPA, and Ireland's Eye SPA). The applicant is requested to review the EIAR and NIS to apply rates more appropriate to the location and scale of the development, and in line with industry recommendations (60% displacement and 1-5% mortality for auks; and 70% displacement and 1-3% mortality for Northern Gannet; NatureScot, 2023), to inform assessment and enable comprehensive conclusions. Where impacts with these rates result in a >1% increase in baseline mortality rate, the mortality estimates should be taken forward to PVA. | The Developer maintains its position on concluding on the preferred rates for the displacement assessment (presented within Appendix A.15.5: Offshore Ornithology Displacement Analysis), though an assessment based on NatureScot advised rates is now also presented within this Addendum (see Section 15.5.2.1 and 15.5.3.1). |
| 8cii. | Black-legged Kittiwake Displacement: Appendices 15.7, 15.8 and 15.9 document a proposed method statement for ornithology for the Irish Sea Phase 1 ORE projects, which was responded to by the NPWS, with a further response by the applicant to the NPWS response. The issue of Black-legged Kittiwake <i>Rissa tridactyla</i> displacement has been set out in the EIAR and within the appendices referenced. The Board notes that the species is a SCI for the NWIS cSPA, as well as Lambay Island SPA and Ireland's Eye SPA within foraging range of the proposed array area. Black-legged Kittiwake has variable responses to OWFs, ranging from up to 45% displacement effects to mild attraction effects, varying at different latitudes, distances from colonies, and seasons (e.g. Peschko et al., 2020; Pollock et al., 2024). Having reviewed the information presented, the Board disagrees with the screening out of Black-legged Kittiwake for displacement for reasons related to the proximity of the proposed development to the coast and to breeding colonies. | The Developer maintains its position on the exclusion of kittiwake from the displacement assessment conclusion, as justified within Appendix A15.5: Offshore Ornithology Displacement Analysis. However, an assessment of kittiwake displacement has been undertaken using NatureScot (2023) advised rates, presented in Section 15.5.2.1 and 15.5.3.1 of this Addendum. |

| RFI Section | RFI | Relevance to Chapter |
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| | <p>The applicant is requested to use the displacement matrix approach, as for other species. Here, a 30% displacement rate should be applied, and mortality rates should be based on best available evidence, but with a range of rates presented, from 1% to 3%, as advised by NatureScot (2023).</p> <p>The applicant, based on the revised findings, is requested to re-analyse the displacement impacts on the regional population of Black-legged Kittiwake in the EIAR and against the Conservation Objectives of the relevant SPAs and SPA in the NIS to ensure comprehensiveness of appropriate assessment conclusions.</p> | |
| 8ciii. | <p>Red-throated Diver Displacement: The Board requests that the applicant reconsiders screening out displacement effects on Red-throated Diver associated with the array area. As noted in point a(iii) above, Red-throated Diver is highly sensitive to displacement effects associated with OWFs and vessel traffic (e.g. Furness et al., 2013; Bradbury et al., 2014a-b, Fliessbach et al., 2019). As described in point a(iii) and the references therein, Red-throated Diver can be displaced by OWFs up to 10km. The species is a SCI of the NWIS cSPA and the region supports an important wintering population (HiDef, 2019). The applicant is requested to use appropriate data (as discussed in points a(ii) and (iii) above) to assess potential displacement impacts to the regional and the SPA Red-throated Diver populations in the EIAR and the NIS. The applicant should consider displacement effects up to 10km from the proposed array area during operation.</p> | <p>The Developer has now undertaken an assessment of displacement impacts on red-throated diver in the Projected Footprint of Infrastructure (PFI) and a surrounding 10km buffer, as presented in Section 15.5.2.1 and 15.5.3.1 of this Addendum.</p> <p>Information on the PFI is outlined within the methodology in Section 15.2.2.</p> |
| 8civ. | <p>Collision Risk Modelling: It is noted that Roseate Tern flight height data and its analysis were not presented in the Johnston et al. (2014) paper referenced in Appendix 18. The DAU in their observation recommends that clarification be sought as to the sources of the precise parameters for Roseate Tern flight behaviour used in the CRM as well as a statement regarding the robustness of such data. The applicant is requested to address this issue.</p> | <p>An updated assessment has been undertaken for Roseate tern collision risk modelling (see Section 15.5.3.2), using common tern flight height data as a proxy, representing the most appropriate (yet still sufficiently precautionary) data available for this species.</p> |
| 8cv. | <p>The Board notes that Natural England have accepted a 70% reduction in Northern Gannet collision mortality estimates to account for macro-avoidance for other offshore wind farm developments, such as Hornsea 4. However, given the proximity of the proposed development to the coast and to the nearest breeding colony at Ireland's Eye (c. 15km away), a more precautionary approach is recommended. The applicant is requested to revise the approach taken in relation to Northern Gannet collision estimates so they are not reduced by 70% to account for macro-avoidance.</p> | <p>The Developer maintains its position and assessment conclusion on the use of 70% macro-avoidance for gannet, though outputs both with and without macro-avoidance are presented in Section 15.5.3.2 of this Addendum.</p> |
| 8cvi. | <p>Any potential specific mitigation measures to minimise the effects of the project on birds, such as painting of turbine blades, the use of curtailment systems in particular conditions or at particular times etc, if considered appropriate, should also be included and addressed in the application documentation.</p> | <p>Embedded mitigation measures adopted by the Developer are presented in Section 15.4.5 of this Addendum, with further (Secondary) mitigation measures presented in Section 15.6.1.</p> |

| RFI Section | RFI | Relevance to Chapter |
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| 8vii. | <p>Impacts to Prey Species: The DAU in their observation states that the documentation submitted does not appear to include any consideration of potential indirect effects of the proposed development on the likely prey-base (i.e. Atlantic salmon <i>Salmo salar</i>) for resident Common Kingfisher <i>Alcedo atthis</i>, an Annex I species and a SCI for the River Boyne and Blackwater SPA. The DAU also state that there does not appear to be any consideration of the potential effects with respect to either the associated construction works and/or operation of the development on the Conservation Objectives of the River Boyne and River Blackwater SPA; which is connected to the River Boyne SAC, Boyne Coast and Estuary SAC, and the offshore marine waters of the Irish Sea. The applicant is requested to address the issues raised. The applicant is requested to fully assess the potential impacts on Atlantic herring <i>Clupea harengus</i> potential spawning habitat. The applicant is requested to review the application in this regard and clarify potential effects on seabird prey populations</p> | <p>The Developer confirms that Section 3.4, of Appendix A13.1: Fish and Shellfish Ecology Baseline Characterisation has been updated to provide further detail on forage fish and other important prey species. Addendum to Chapter 13 Fish and Shellfish Ecology has also been updated to include further references to potential impacts forage species. Furthermore, Section 13.3.9 of Chapter 13 has been updated to include reference to the River Boyne and River Blackwater SAC which is designated for Atlantic salmon and river lamprey. Lastly, the potential for impact to Atlantic herring spawning habitat have been further assessed through reference to PSA data collected along the ECC and within the array area in 2025 (AQUAFAC, 2025), and heatmapping in accordance with the Kyle-Henney (2024) methodology. The revised assessment is detailed in Chapter 13 Fish and Shellfish Ecology.</p> |
| 8di. | <p>Cumulative Effects Assessment: Impacts on birds in the CEA (Section 15.9 of Chapter 15, and Chapter 38) are presented and assessed against annual populations only. Having regard to points a(vii) Regional Breeding Population and c(i) Displacement Methodology above, the applicant is requested to revise the CEA to ensure impacts are presented and assessed against the breeding and non-breeding season populations separately.</p> | <p>The Developer has provided an assessment against breeding and non-breeding populations separately within Sections 15.9.5, 15.9.6, and 15.9.7 of this Addendum.</p> |
| 8dii. | <p>Migratory Waterbird Species: Migratory birds have not been included in the Cumulative and Inter-related Effects Assessment presented in the application documentation. As stated previously (points a(iv) Migratory Birds and a(v) Terrestrial Birds), the Board has requested further assessment of the impact on migratory birds for the project, and further data to inform the assessment. The applicant is requested to assess cumulative impacts to migratory bird populations, considering effects of the Irish Sea Phase 1 ORE projects and other existing or currently proposed plans and projects that may affect the same migratory populations. The applicant is requested to update the application documentation, as required.</p> | <p>The Developer has provided a cumulative assessment on migratory waterbirds, considering cumulative effects from other Irish Sea Phase 1 ORE projects, presented in Section 15.9.9 of this Addendum.</p> <p>The collision risk modelling has been fully updated within Appendix A15.4: Offshore Ornithology Migratory Collision Risk Modelling: Irish East Coast Phase One Offshore Wind Projects Cumulative Assessment.</p> |

15.1.1 Overview

This section has been updated to reflect the updated documents that should be read in conjunction with this assessment. The following paragraph within Section 15.1.1 of Chapter 15 in the 2024 EIAR shall be deleted:

- *Appendix 15.1: Offshore and Intertidal Ornithology Technical Baseline (hereafter referred to as the Technical Baseline)*
- *Appendix 15.2: MRSea Modelling for Offshore Ornithology (hereafter referred to as the MRSea Modelling Report)*
- *Appendix 15.3 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment (CRM; hereafter referred to as the CRM Report)*
- *Appendix 15.4 Offshore and Intertidal Ornithology Migratory Collision Risk Modelling (hereafter referred to as the Migratory Report)*
- *Appendix 15.5 Offshore and Intertidal Ornithology Displacement Analysis (hereafter referred to as the Displacement Report)*
- *Appendix 15.6 Offshore and Intertidal Ornithology Population Viability Analysis (PVA; hereafter referred to as the PVA Report)*
- *Appendix 15.7 Method Statement – Offshore Wind Ornithology Assessment for East Coast Phase One Projects (hereafter referred to as the Irish Phase One Method Statement)*
- *Appendix 15.8 NPWS Review of Method Statement; and*
- *Appendix 15.9: Method Statement Review Consultation and Justification Log.*
- *All figures within this Chapter are provided in Volume 7A.*

And be replaced with:

- Appendix A15.1: Offshore and Intertidal Ornithology Technical Baseline
- Appendix A15.2: MRSea Modelling for Offshore Ornithology
- Appendix A15.3 Offshore and Intertidal Ornithology Collision Risk Modelling Assessment
- Appendix A15.4: Offshore Ornithology Migratory Collision Risk Modelling: Irish East Coast Phase One Offshore Wind Projects Cumulative Assessment
- Appendix A15.5 Offshore and Intertidal Ornithology Displacement Analysis
- Appendix A15.6 Offshore and Intertidal Ornithology Population Viability Analysis
- Appendix A15.7: Migratory Bird Survey Report 2026
- Appendix 15.8 NPWS Review of Method Statement; and
- Appendix 15.9: Method Statement Review Consultation and Justification Log.
- Appendix A15.8: Offshore and Intertidal Ornithology Apportioning Appendix
- All figures within this Chapter are provided in Volume 7A.

15.2 Methodology

The methodological approach in this Addendum has been updated to address specific RFI requirements relating to the study area definition, data collection, population estimation, and the application of current technical guidance. In response to RFI 8(aii) and 8(aiii), the ornithology study area has been refined to the Projected Footprint of Infrastructure (PFI)¹ plus a 10 km buffer (as described in Section 15.2.2), supported by a 12-month NWIS cSPA DAS dataset (termed NWIS DAS) collected during 2024-2025 providing full coverage of red-throated diver and other key species. Additional VP surveys and passive acoustic monitoring (PAM) collected in autumn 2024–2025 have been incorporated to meet the requirements of RFI 8(iv) and 8(v) for improved migratory and terrestrial bird data inputs.

The methodology has also been updated to reflect the most recent ornithological guidance. In line with RFI 8(vi), the Addendum now relies exclusively on the most up-to-date datasets, including extended DAS coverage of the NWIS cSPA. New policy and technical guidance (e.g. JNCC *et al.* (2024) and NatureScot (2023)) have been adopted within the CRM and displacement assessments, addressing RFI 8(civ) and 8(cv) relating to updated model parameters and avoidance assumptions.

In compliance with RFI 8(avii), Method 2 has been applied exclusively for the estimation of regional breeding populations. While this approach is highly precautionary and can result in relatively small population estimates, it has been used consistently to ensure a standardised approach across all species.

Updates required by RFI 8(ci) and 8(cii) have also been implemented through the inclusion of NatureScot-recommended displacement and mortality rates for auks, kittiwake, and gannet within the assessment framework.

Finally, for the purposes of this assessment, the NWIS site is referred to as a candidate SPA (cSPA). Notwithstanding this status, it is acknowledged the site is afforded the same protections as a designated SPA, and it has been assessed on that basis throughout this assessment.

15.2.1 Introduction

There are no changes to this section. Refer to Section 15.2.1 of Chapter 15 in the 2024 EIAR.

15.2.2 Study Area

This section has been updated to reflect the new study area covering the PFI plus a 10km buffer, the ECC plus a 2km buffer in response to RFI 8(ciii) and to reflect the refinements made to Project Option 1 and 2 wind turbine (WTG) layouts (Appendix A5.1: Design Refinements). This updates the previous study area in Chapter 15 of the 2024 EIAR which covered a 4km buffer from the array area, and the ECC with no surrounding buffer.

The following paragraph within Section 15.2.2 of Chapter 15 in the 2024 EIAR shall be deleted:

The offshore and intertidal ornithology study area was initially identified at the proposed development scoping phase as the Maritime Area Consent (MAC) boundary plus 4km buffer, in line with Department of Communications, Climate Action and Environment (DCCAE) (now the Department of the Environment, Climate and Communications; DECC) Guidance (DCCAE, 2017) (Scoping report: Appendix 2.1). This initial study area was used to scope the survey methodologies and inform baseline data gathering. The extent of the digital aerial survey (DAS) that has been undertaken is the MAC Boundary with a 4km buffer but excludes the offshore Export Cable Corridor (ECC) (refer to Section 15.2.5).

This baseline data and other sources (refer to Section 15.2.4) have been used to generate abundance and density estimates for each species and this is presented in the Technical Baseline appendix. Regional and/or

¹ The PFI represents the defined sub-area of the overall array area where all long-term above surface offshore infrastructure will be located, following design refinements to minimise spatial overlap with sensitive receptors. Refers to the overlap of Project Option 1 and 2 layouts + Limit of deviation (LOD)

the biogeographical population data has also been considered. This allows consideration of the mobile nature of the ornithology species when determining potential receptors and their baseline characterisation.

And be replaced with:

The offshore and intertidal ornithology study area was initially identified at the EIA scoping stage as the Maritime Area Consent (MAC) boundary plus 4km buffer, in line with Department of Communications, Climate Action and Environment (DCCE) (now the Department of Climate, Energy and the Environment; DCEE) Guidance (DCCAE, 2017) (Scoping report: Appendix 2.1 of the 2024 EIAR). This initial study area was used to scope the survey methodologies and inform baseline data gathering. Since submission of the Planning Application in June 2024, the Developer has implemented additional design refinements, including a reduction in the spatial extent of offshore infrastructure within which the turbines will be placed within the array area to reduce coverage of the proposed development within the NWIS cSPA. This therefore reduces the area from which birds may be displaced. This reduced area is termed the PFI which incorporates the spatial extent of both Project Options 1 and 2 and the 500m LoD, covering any area within which wind turbines (WTGs) infrastructure may be placed (Technical Baseline Figure A2-1). The remainder of the array area will not have any WTGs placed within it. Additionally, in response to RFI 8(ciii), the surrounding buffer now extends to 10km (instead of the original 4km), accounting for potential displacement impacts on red-throated diver.

The full extent of the offshore and intertidal ornithology study area is therefore now defined as the PFI plus a 10km buffer, reflecting the requirements of the updated red-throated diver assessment. This revised study area supersedes the original scoping area (the MAC boundary plus a 4km buffer) and provides the maximum spatial extent used to characterise offshore ornithological receptors. In addition to the original baseline digital aerial survey (DAS) dataset collected across the MAC Boundary + 4km area (termed MAC DAS), a further 12 months of DAS covering the full NWIS cSPA were undertaken (termed NWIS DAS). These additional data now form an integral part of the baseline. Together, the combined datasets, supported by desk-based sources have been used to generate abundance and density estimates for all relevant species and to account for regional and biogeographical population contexts. This ensures that the baseline fully captures the mobile nature of seabirds and other ornithological receptors when defining those relevant to the assessment.

The following paragraphs of Section 15.2.2 of Chapter 15 in the 2024 EIAR shall be deleted:

There are four study areas used within this chapter for the purposes of the impact assessment, which are based on a Zone of Influence (ZoI) that is dependent on the results of the baseline data gathering, the nature of the impact, and the sensitivity of the species to that impact. The study areas are presented on Figure 15.1 and are:

- *The study area for disturbance and displacement impacts to seabird species (excluding ducks and divers) from activities and infrastructure in the array area, is the array area plus a 2km buffer*
- *The study area for disturbance and displacement impacts to seaducks and divers from activities and infrastructure within the ECC is limited to the ECC only*
- *The study area for disturbance and displacement impacts to birds found within the intertidal and nearshore area (assessed qualitatively), is the ECC only; and*
- *The study area for collision impacts to seabirds is limited to the array area only.*

Following review of the baseline data and establishing the ZoI's, seaducks and divers were scoped out of the displacement and disturbance impact assessment from the array area and so a study area for this is not included within the above (refer to Section 15.5.2.1).

And be replaced with:

The study area used within this chapter for the purposes of the impact assessment covers the following areas:

- PFI + 10km buffer,
- ECC + 2km (as far as the Low Water Mark (LWM), and

- Intertidal area within the proposed landfall site encompassing the area between the High Water Mark (HWM) and LWM.

The ornithological study area is presented in Figure A15.1 of Volume 7A.

The relevant Zone of Influence (ZoI) is dependent on the baseline data gathering, the nature of the impact, and the sensitivity of the species to that impact. This therefore varies by species and impact. The relevant ZoIs are:

- The PFI only for collision impacts to seabirds and migratory birds;
- PFI plus a 2km buffer for disturbance and displacement impacts to seabird species (excluding seaducks and divers) from activities and infrastructure in the array area;
- PFI plus a 4km buffer and the ECC plus a 2km buffer for disturbance and displacement impacts to seaducks and divers (excluding red-throated diver) from activities and infrastructure within the array area and ECC, respectively;
- PFI plus a 10km buffer and the ECC plus a 2km buffer for disturbance and displacement impacts to red-throated diver from activities and infrastructure within the array area and ECC, respectively; and
- The nearshore ECC only for disturbance and displacement impacts to birds found within the intertidal and nearshore area (assessed qualitatively).

For the assessment of displacement impacts from vessel traffic within the ECC, the assessment considers the impacts of one vessel cluster, with a surrounding 3km buffer. It is noted that a 2km buffer round vessels is standard use, but a 3km buffer is used here as a precautionary approach, accounting for the fact that vessels may be up to a kilometre apart from each other at a given point. Based on this, the area disturbed from the vessel cluster was calculated to be 28.3km², from which birds could be displaced.

There are no other changes required to this section. Refer to Section 15.2.2 of Chapter 15 of the 2024 EIAR.

15.2.3 Relevant Guidance and Policy

This section has been updated owing to the release of updated UK guidance for ornithological assessments which was not available at the time of the 2024 EIAR submission, and the time of drafting the Irish Phase One Methodology Statement. Within the 2024 EIAR, a key part of the guidance used was the development of the ‘Irish Phase One Methodology Statement’, developed collaboratively by east coast Phase One Irish Projects. However, the Irish Phase One Methodology Statement is no longer relied upon as a key document due to the publication of more recent guidance.

The following paragraphs of Section 15.2.3 of Chapter 15 in the 2024 EIAR shall be deleted:

The EIAR for the proposed development also draws on a number of relevant guidance documents. As a key part of this, east coast Phase one Irish projects (hereafter ‘Phase one projects’) have developed a methodology statement for ornithological assessments to promote consistency across impact assessments, referred to in this EIAR chapter as the ‘Irish Phase One Methodology Statement’. This approach has been welcomed by NPWS and they have given responses to the material provided which have been considered within the impact assessment. A summary of these responses and how they have been considered within the assessment is provided in Appendix 15.9: Method Statement Review Consultation and Justification Log. In addition, the following guidance documents have been used to inform the approach:

- *Updated CRM guidance by Natural England (Natural England, 2022) and the JNCC (JNCC, 2023) based on original data by Cook et al. (2012) developed for use on the Band model (Band et al., 2012)*
- *Recently published guidance from NatureScot for the assessment of offshore wind farm (OWF) impacts on ornithological receptors (NatureScot, 2023a,b,c,d); and*
- *Updated guidance on assessing displacement impacts (MIG-Birds, 2022).*

Further to this, the following guidance documents have been used to inform the ornithological impact assessment:

- *Guidance on best practice for baseline data, the evidence plan process and data analysis and presentation provided by Natural England (Parker et al., 2022a,b,c)*
- *Natural England interim advice on updated Collision Risk Modelling parameters (Natural England, 2022)*
- *NRW's offshore wind developments online information (NRW, 2023)*
- *Guidelines on the information to be contained in Environmental Impact Assessment Reports by the Environment Protection Agency (EPA, 2022)*
- *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Marine and Coastal published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018)*
- *Assessment methodologies for offshore wind farms (Maclean et al., 2009)*
- *Guidance on ornithological cumulative impact assessment for offshore wind developers (King et al., 2009)*
- *Assessing the risk of offshore wind farm development to migratory birds (Wright et al., 2012); and*
- *Vulnerability of seabirds to offshore wind farms (Furness and Wade, 2012; Furness et al., 2013; Wade et al., 2016; Bradbury et al., 2014).*

And be replaced with:

The EIAR for the proposed development also draws on a number of relevant guidance documents including the UK Joint SNCB guidance on CRM (JNCC et al., 2024) which supersedes the Natural England (2022) guidance. Updates to guidance documents used to inform the Addendum to Chapter 15 Offshore Ornithology assessments therefore include:

- Joint SNCB Guidance on Collision Risk Modelling (JNCC et al., 2024);
- NatureScot guidance for the assessment of offshore wind farm (OWF) impacts on ornithological receptors (NatureScot, 2023a,b,c,d); and
- Joint SNCB guidance on assessing displacement impacts (MIG-Birds, 2022a).

Further to this, the following guidance documents have been used to inform the ornithological impact assessment:

- *Guidance on best practice for baseline data, the evidence plan process and data analysis and presentation provided by Natural England (Parker et al., 2022a,b,c), and updated guidance to best practice for baseline data and data and evidence expectations (Parker et al., 2025a,c);*
- *Natural Resource Wales (NRW's) offshore wind developments online information (NRW, 2023);*
- *Guidelines on the information to be contained in Environmental Impact Assessment Reports by the Environment Protection Agency (EPA, 2022);*
- *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Marine and Coastal published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018);*
- *Assessment methodologies for offshore wind farms (Maclean et al., 2009);*
- *Guidance on ornithological cumulative impact assessment for offshore wind developers (King et al., 2009);*
- *Assessing the risk of offshore wind farm development to migratory birds (Wright et al., 2012; Woodward et al., 2023); and*

- Vulnerability of seabirds to offshore wind farms (Furness and Wade, 2012; Furness *et al.*, 2013; Wade *et al.*, 2016; Bradbury *et al.*, 2014).

There are no other changes required to this section. Refer to Section 15.2.3 of Chapter 15 of the 2024 EIAR for information on relevant policy.

15.2.4 Data Collection and Collation

This section has been updated to account for updated DAS surveys covering the NWIS cSPA, which subsequently covers the PFI, PFI + 10km buffer and the full ECC, and additional VP survey data, described in Table A15.2 below. This additional survey coverage was triggered by RFI 8(aii) and 8(aiii), which required expanded survey data for red-throated diver, and by RFI 8(iv) and 8(v), which requested further site-specific data on migratory and terrestrial birds.

15.2.5 Site-specific Surveys

Table 15.2 has been replaced with Table A15.2 below to include additional survey data as described in Section 15.2.4 above.

Table A15.2 Site-specific data considered in the development of the ornithology baseline (replaces Table 15-2 within Chapter 15 of the 2024 EIAR)

| Source | Date | Summary | Temporal and spatial coverage |
|-------------------------------------|-------------|--|--|
| Existing project survey data | | | |
| Boat-based survey data | 2019 - 2022 | Vessel surveys were conducted by in November 2019, January 2020, March 2020, August 2020, June 2021, July 2021, and July 2022. Initial baseline characterisation was undertaken using vessel-based surveys, however these were then succeeded by DAS data collection as the main form of data collection in line with industry standard (e.g., as requested by SNCBs for UK projects). Vessel surveys were consequently used as supplementary data only, as outlined in the Technical Baseline. | Array area within the foreshore licence plus a 4km buffer. Variable transects and coverage. |
| Coastal VP surveys | 2019 - 2021 | VP surveys conducted at two locations to better quantify the movements of migratory species and to supplement DAS data collection | Includes the intertidal area and out to the array area at the north and south edge at each location respectively. |
| NISA – MAC DAS | 2020-2022 | DAS surveys conducted by APEM Ltd. on a monthly basis between May 2020 and October 2022, with data used to characterise the baseline environment and form the main basis of the assessment of likely significant effects from the proposed development. Throughout this process, boundary refinements have taken place, with the final PFI now representing 29% of the MAC boundary. The data used to inform this EIAR chapter consists of data within the final PFI and 10km buffer for the proposed development. | A total of 16 transects with 2.3km spacing totalling 15% coverage of the MAC boundary plus 4km buffer survey area. The MAC DAS survey extent mirrored the array area within the foreshore licence plus a 4km buffer. The DAS survey extent was updated in November 2020 to include the entire MAC boundary (which included the small area beyond 12nm that was not within the original DAS survey extent). See Technical Baseline Figure A2-2 for the survey transects and coverage. |
| Landfall surveys | 2021 - 2022 | Intertidal bird surveys were conducted at the selected landfall site to characterise the baseline environment in terms of ornithological receptors. | Includes the intertidal area and immediate onshore area of the landfall. |
| NISA- NWIS DAS | 2024-2025 | DAS conducted by APEM Ltd. monthly between September 2024 and August 2025. Covered the PFI, PFI + 10km buffer and the ECC + 2 km buffer. | NWIS cSPA extent. A total of 17-19 transects (dependent on flight plan) with 3.5km spacing totalling 15-18% coverage. A maximum survey area of 2,396km ² was covered. |

| Source | Date | Summary | Temporal and spatial coverage |
|---|------|--|--|
| | | | See Technical Baseline Figure A2-3 for the survey transects and coverage. |
| NISA – Coastal VP surveys including Rockabill Island | 2025 | VP surveys conducted at three locations to inform the migratory bird assessment. | Weekly VP surveys from three locations throughout the 2025 Autumn migration season (Sep–Dec 2025). In addition there were three boat-based surveys conducted in the 2024 autumn. |
| NISA – Coastal PAM surveys including Rockabill Island | 2025 | PAM conducted on Rockabill Island to inform the migratory bird assessment. | Coverage of the autumn migration period from 4 September to 13 November 2025 on Rockabill Island. This recording period included 71 nights of bioacoustics data comprised of 830 recording blocks. |

There are no other changes required to this section. Refer to Section 15.2.5 of Chapter 15 of the 2024 EIAR.

15.2.6 Desk-based Review

This section, specifically Table 15.3 has been updated to reflect the most up-to-date sources used in this Addendum and is in response to RFI Section 1 (b) and is replaced by Table A15.3. All literature references have been reviewed and revised to ensure that the assessment draws exclusively on the latest available information, including updated ornithological guidance, population data, and technical standards relevant to offshore and intertidal ornithology.

Table A15.3 Desktop study data considered in the development of the ornithology baseline (replaces Table 15-3 within Chapter 15 of the 2024 EIAR).

| Source(s) | Date | Summary | Temporal and spatial coverage |
|--|---------------|--|--|
| Relevant literature on seabird distribution, population sizes, migration routes and foraging ranges | | | |
| JNCC Report No. 267 (Pollock et al. 1997) | 1997 | European Seabirds at Sea (ESAS) survey data collected between 1980 and 1997 in Irish waters, including a period of intensive surveys between 1994 and 1997, which targeted areas around Ireland with poor survey coverage. Used to provide historic context for the wider Irish Sea. | Offshore waters around Ireland, within and beyond Ireland’s continental shelf. |
| ObSERVE (Jessop et al. 2018) | 2018 | Visual aerial surveys of the western Irish Sea. Four surveys: summer 2015, winter 2015, summer 2016 and winter 2016. | Offshore waters around Ireland, within and beyond Ireland’s continental shelf. |
| Designated sites | Various dates | Information of SPAs and other designations relevant to Important Ornithological Features (IOFs) with potential connectivity to the proposed development. Key sources of information are the Natural England, NPWS, NatureScot and NRW designated sites portals. | Country wide information on designated sites. |
| Seabirds Count 2023 (Burnell et al., 2023) | 2015–2021 | A comprehensive census (2015–2021) of 25 breeding seabird species across Britain and Ireland, covering >10,000 colony sites. Results show widespread declines in many species, with some increasing. Forms the core evidence base for seabird conservation and SPA assessments. | Full geographical coverage of Britain and Ireland |
| Seabird Monitoring Programme (SMP) (BTO, 2026) | 2015-present | Online database of seabird colony counts in Ireland and UK – most recent data from Seabirds Count national census | Colony counts in Ireland and UK |

| Source(s) | Date | Summary | Temporal and spatial coverage |
|--|----------------|--|---|
| | | 2015-2021. Used to provide SPA reference populations for the EIAR. | |
| NPWS Published Report (Cummins et al. 2019) | 2019 | The Status of Ireland's Breeding Seabirds: Birds Directive Article 12 Reporting 2013 – 2018. Used to provide SPA reference populations for the EIAR. | Ireland |
| Birdwatch Ireland Irish Wetland Bird Survey (I-WEBS) | Annual Reports | Annual survey reports of wetland waterbirds and intertidal birds throughout the Republic of Ireland. | Coverage of Irish intertidal and wetland zones. |
| Regional and national bird reports and atlases | Various | Atlases covering breeding and non-breeding birds within relevant areas, e.g. Birds in Ireland (Hutchinson, 2010), North-west European waters (Stone et al., 1995) and in Europe (BirdLife international, 2004). | Coverage across region at various intertidal and wetland and coastal areas. |
| Review of seabird foraging ranges - Woodward et al., (2019) | 2019 | British Trust for Ornithology (BTO) report updating foraging ranges of seabirds. These are used to consider connectivity with both designated sites and other OWFs. This report provides an update from previous information on foraging ranges from Thaxter et al., (2012). | Review of foraging ranges covered available information across the globe. |
| Literature on seabird foraging movements | Various | Various sources on seabird foraging (e.g. tracking data), including the FAME Project (Baer & Newton, 2012) and tern tracking data at Rockabill Island (Perrow et al., 2019) | Various sources in Ireland. |
| Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (regional population) – Furness (2015) | 2015 | Furness 2015 provides regional non-breeding season population sizes for relevant offshore ornithological receptors. Though focussed on UK waters, population sizes in UK Western Waters are considered relevant to Ireland. | Coverage across the UK. |
| The status of Ireland's Breeding Seabirds: Birds Directive Article 12 Reporting 2013 – 2018 – Cummins et al. (2019) | 2019 | NPWS commissioned report providing data on breeding seabird population sizes and trends of Ireland's breeding seabird species. | Coverage across Ireland |
| Literature on migratory bird populations and movements relevant to the proposed development | Various | Various sources on migratory birds and movements, including 'The Migration Atlas: Movements of the birds of Britain and Ireland' (Wernham et al., 2002), literature on the risk of OWF developments to migratory birds (Wright et al., 2012), and review of non-seabird features of SPAs used to inform migratory CRM assessment tool (Woodward et al., 2023). | UK and Ireland. |
| Bird breeding ecology | Various dates | Information on the breeding ecology of various bird species e.g., Cramp and Simmons, 1977-94; Del Hoyo et al., 1992-2011; Camphuysen (2002); Robinson, 2005; Harris et al. (2015); Buckingham et al. (2022); Dunn et al. (2020; 2022). | Generic information applicable to the proposed development IOFs. |
| JNCC review of seabird demographic rates (Horswill and Robinson 2015) | 2015 | Information on demographic rates of seabirds, used to inform the EIAR assessment. | Predominantly UK based, with data from further afield also considered. |

| Source(s) | Date | Summary | Temporal and spatial coverage |
|---|---------------|---|--|
| eBird ² citizen science data | Various dates | Information on bird observations in relevant areas was used to supplement VP surveys (e.g., data from Clogher Head ³ to compare recorded species distributions)/ | UK and Ireland |
| Relevant literature on the vulnerability of birds to OWFs | | | |
| Potential impacts of offshore windfarms on birds | Various dates | Various peer reviewed scientific literature regarding the potential impacts from OWF e.g. (Garthe and Hüppop, 2004; Drewitt and Langston, 2006; Stienen et al., 2007; Speakman et al., 2009; Langston, 2010; Band, 2012; Cook et al., 2012; Furness and Wade, 2012; Wright et al., 2012; Furness et al., 2013; Johnston et al., 2014; Cook et al., 2014; Dierschke et al., 2017; Jarrett et al., 2018; Leopold & Verdaat, 2018; Mendel et al., 2019); APEM (2022); GoBe (2024); Trinder et al. (2024); Degraer et al. (2020); Lamb et al. (2024); Woodward et al. (2023). | Generic information applicable to the proposed development IOFs. |
| Potential impacts resulting from highly pathogenic avian influenza (HPAI) | Various | Various literature regarding the impacts of HPAI on seabird species is considered in relation to potential additional impacts on ornithological receptors assessed in this EIAR. These include: Paradell et al., (2023), Lane et al., (2023), Pearce-Higgins et al., 2022). Available information on HPAI from sources such as Birdwatch Ireland and the BTO is also considered wherever relevant. | Ireland and further afield. |

There are no other changes required to this section. Refer to Section 15.2.6 of Chapter 15 of the 2024 EIAR.

15.2.7 Data Limitations

This section has been updated to reflect the inclusion of the NWIS DAS data; this additional coverage was triggered by RFI 8(aii) and 8(aiii). Accordingly, the data collection period has been revised, and the updated dataset has been used to reassess the PFI and surrounding 10 km buffer and for the ECC assessment.

The following paragraph within Section 15.2.7 of Chapter 15 in the 2024 EIAR shall be deleted:

The marine environment is highly variable, both spatially and temporally. The baseline site characterisation for the offshore ornithology impact assessment is based on site-specific data, predominantly 29 months of DAS data collected within the offshore and intertidal ornithology study area. These are considered to provide representative seabird usage for the purposes of impact assessment, with landfall and vantagepoint surveys also used to characterise both the offshore and intertidal ornithology study areas.

And be replaced with:

The marine environment is highly variable, both spatially and temporally. The baseline site characterisation for the offshore ornithology impact assessment is based on site-specific data, predominantly 41 months of DAS data collected within the offshore and intertidal ornithology study area.

These are considered to provide representative seabird usage for the purposes of impact assessment, with landfall and VP surveys also used to characterise both the offshore and intertidal ornithology study areas. See Appendix 15.1: Offshore and Intertidal Ornithology Technical Baseline for further detail on how datasets were combined.

³ <https://ebird.org/barchart?r=L7333978&yr=all&m=>

Likewise, the following paragraph within Section 15.2.7 of Chapter 15 in the 2024 EIAR shall be deleted:

To reflect the higher suitability of DAS data collection, this method became the primary form of baseline characterisation data as of May 2020. Though there are also standard limitations to this method, notably that DAS surveys only provide a snapshot survey of a specific day and timeframe which may not be representative of overall density at a site, and the fact that DAS surveys are limited by certain weather conditions (e.g. in January 2020, an aerial survey was not undertaken due to adverse weather), this form of data collection is currently considered industry best practice in the UK (e.g. it is currently used routinely as the primary means of data collection at UK projects). Additionally, to improve the representativeness of data, the proposed development undertook data collection over 29 months (as opposed to the standard minimum of 24-months) which provided a larger dataset and data across a third breeding season to provide greater confidence in seasonal abundance and density data.

And be replaced with:

To reflect the higher suitability of DAS data collection, this method became the primary form of baseline characterisation data as of May 2020. Though there are also standard limitations to this method, notably that DAS surveys only provide a snapshot survey of a specific day and timeframe which may not be representative of overall density at a site, and the fact that DAS surveys are limited by certain weather conditions (e.g. in January 2020, an aerial survey was not undertaken due to adverse weather), this form of data collection is currently considered industry best practice in the UK (e.g. it is currently used routinely as the primary means of data collection at UK offshore wind farm projects). Additionally, to improve the representativeness of data, the proposed development undertook data collection over 41 months (as opposed to the standard minimum of 24 months) which provided a larger dataset and data across four breeding seasons to provide greater confidence in seasonal abundance and density data.

Finally, the following text of Section 15.2.7 within Chapter 15 of the 2024 EIAR shall be deleted:

For the assessment within the ECC, DAS data from Jessop et al., (2018) were used. Confidence in this data is also considered high, with the surveys representing a 10.5% coverage of the ECC plus 4km buffer (in line with the industry standard of 10% coverage).

And be replaced with:

For the assessment within the ECC, DAS data from the recent 12 month NWIS DAS were used. Confidence in this data is considered high, with the surveys representing a >18% coverage of the ECC plus 2km buffer (considerably higher than the industry standard of 10% coverage).

There are no other changes required to this section. Refer to Section 15.2.7 of Chapter 15 of the 2024 EIAR.

15.2.7.1 Confidence in the assessment conclusions

There are no changes to this section. Refer to Section 15.2.7.1 of Chapter 15 in the 2024 EIAR.

15.2.8 Designated Sites

There are no changes to this section. Refer to Section 15.2.8 of Chapter 15 in the 2024 EIAR. For updates to species abundances see Section 15.3.2.

15.2.9 Methodology for the Assessment of Effects

There are no changes to this section. Refer to Section 15.2.9 of Chapter 15 in the 2024 EIAR.

15.3 Baseline Environment

15.3.1 Introduction

The section has been updated to reflect the recently collected NWIS DAS data that has been collected to improve the baseline characterisation. This additional survey coverage was informed by RFI 8(aii) and 8(aiii), which required expanded DAS data for red-throated diver, and by RFI 8(aiv) and 8(av), which requested further site-specific data on migratory and terrestrial birds.

The following paragraphs of Section 15.3.1 of Chapter 15 in the 2024 EIAR shall be deleted:

As highlighted in Section 15.2.6, the following site-specific surveys were undertaken to inform the baseline environment for offshore and intertidal ornithological receptors:

- 29 months of DAS surveys (May 2020 to October 2022)
- Seven vessel surveys undertaken between November 2019 and July 2022
- Four periods of six coastal vantage-point surveys between September 2019 and May 2021 across two sites; and
- 24 months of landfall surveys (January 2021 to December 2022).

And be replaced with:

As highlighted in Section 15.2.6, the following site-specific surveys were undertaken to inform the baseline environment for offshore and intertidal ornithological receptors:

- 41 months of DAS surveys (May 2020 to October 2022; September 2024 to August 2025);
- Seven vessel surveys undertaken between November 2019 and July 2022;
- Four periods of six coastal vantage-point surveys between September 2019 and May 2021 across two sites;
- A single boat-based VP survey within the NISA array area in autumn of 2024;
- Weekly (onshore) or bi-weekly (offshore: Rockabill Island) migratory bird VP surveys at three locations throughout the 2025 autumn migration season (September to December 2025);
- Continuous PAM at two locations (Bremore and Rockabill Island) throughout the 2025 autumn migration; and
- 24 months of landfall surveys (January 2021 to December 2022).

Full details of ornithological surveys and recorded species are presented in Appendix A15.1: Offshore and Intertidal Ornithology Technical Baseline, with a summary provided in Table A15.4. As outlined in Section 15.2.7, the 41 months of DAS data form the main basis of assessment for offshore ornithological receptors. VP surveys were also used to inform the inclusion of migratory ornithological receptors in migratory collision risk assessment (Impact 7; Section 15.5), and landfall surveys and publicly available data (notably Jessop *et al.*, 2018) used to form the main basis of the assessment for intertidal receptors.

There are no other changes required to this section. Refer to Section 15.3.1 of Chapter 15 of the 2024 EIAR.

15.3.2 Offshore Ornithology

This section has been updated and fully replaces Section 15.3.2 of Chapter 15 in the 2024 EIAR. The updates include incorporating the original 29 months of MAC DAS data with the additional 12 months of NWIS DAS data, providing a total of 41 months of seabird abundance and distribution information. As the two datasets differ in spatial coverage (with MAC DAS limited to the PFI + 4 km buffer and NWIS DAS covering the full SPA and enabling estimates out to 10 km from the PFI).

This additional coverage was triggered by RFI 8(aii) and 8(aiii), which required expanded DAS data for red-throated diver, and by RFI 8(aiv) and 8(av), which requested further site-specific data on migratory and terrestrial birds.

Also, note that commic terns were apportioned to species level when updating the abundance and density estimates and therefore are no longer discussed in this section. In addition, the ObSERVE (Jessop *et al.*, 2018) dataset was no longer favoured for the assessment of the ECC, because the NWIS DAS had more recent, higher resolution coverage of the whole NWIS cSPA including the ECC. For further information refer to Appendix A15.1: Offshore and Intertidal Ornithology Technical Baseline.

Section 15.3.2 of the 2024 EIAR has been deleted and replaced with the revised text below.

For offshore ornithological receptors, the main datasets used to inform assessments are the original 29 months of MAC DAS data and the additional 12 months of NWIS DAS data, providing a total of 41 months of seabird abundance and distribution information. Across 41 months of DAS surveys, 32 bird species were recorded in the PFI. Table A15.4 below presents which bird species were recorded across the PFI as well as within the 2km and 4km buffers only. For full detail of species raw counts, density and abundance estimates refer to Appendix A15.1 Offshore and Intertidal Ornithology Technical Baseline.

Model-based estimates were not applied in the updated assessments because they were not available for all species across the initial 29 months of MAC DAS. Restricting the analysis to design-based estimates ensured a complete, internally consistent dataset and enabled direct like-for-like comparison with the subsequent 12 months of MAC DAS data. For further information on how the datasets were combined see Appendix A15.1 Offshore and Intertidal Ornithology Technical Baseline.

Table A15.4 Bird species recorded during DAS within the PFI, 2km buffer and 4km buffer (replaces Table 15-12 in its entirety within Chapter 15 of the 2024 EIAR).

| Species | PFI | 2km buffer | 4km buffer | 10km buffer |
|---|-----|------------|------------|-------------|
| Whimbrel (<i>Numenius phaeopus</i>) | | | x | x |
| Kittiwake (<i>Rissa tridactyla</i>) | x | x | x | x |
| Black-headed gull (<i>Chroicocephalus ridibundus</i>) | x | x | x | x |
| Little gull (<i>Hydrocoloeus minutus</i>) | | | x | x |
| Common gull (<i>Larus canus</i>) | x | x | x | x |
| Great black-backed gull (<i>Larus marinus</i>) | x | x | x | x |
| Herring gull (<i>Larus argentatus</i>) | x | x | x | x |
| Lesser black-backed gull (<i>Larus fuscus</i>) | x | x | x | x |
| Sandwich tern (<i>Thalasseus sandvicensis</i>) | | x | x | x |
| Roseate tern (<i>Sterna dougallii</i>) | x | x | x | x |
| Common tern (<i>Sterna hirundo</i>) | x | x | x | x |

| Species | PFI | 2km buffer | 4km buffer | 10km buffer |
|---|-----|------------|------------|-------------|
| Arctic tern (<i>Sterna paradisaea</i>) | x | x | x | x |
| Commic tern | x | x | x | x |
| Great skua (<i>Stercorarius skua</i>) | x | x | x | x |
| Arctic skua (<i>Stercorarius parasiticus</i>) | | | x | x |
| Guillemot (<i>Uria aalge</i>) | x | x | x | x |
| Razorbill (<i>Alca torda</i>) | x | x | x | x |
| Black guillemot (<i>Cepphus grylle</i>) | x | x | x | x |
| Puffin (<i>Fratercula arctica</i>) | x | x | x | x |
| Red-throated diver (<i>Gavia stellata</i>) | x | x | x | x |
| Great northern diver (<i>Gavia immer</i>) | x | x | x | x |
| Fulmar (<i>Fulmarus glacialis</i>) | x | x | x | x |
| Sooty shearwater (<i>Ardenna grisea</i>) | x | x | x | x |
| Manx shearwater (<i>Puffinus puffinus</i>) | x | x | x | x |
| Gannet (<i>Morus bassanus</i>) | x | x | x | x |
| Shag (<i>Gulosus aristotelis</i>) | | x | x | x |
| Common Scoter (<i>Melanitta nigra</i>) | | | x | x |
| Feral Pigeon (<i>Columba livia</i>) | | | | x |
| Great Crested Grebe (<i>Podiceps cristatus</i>) | | x | x | x |
| Little Tern (<i>Sternula albifrons</i>) | x | x | x | x |
| Oystercatcher (<i>Haematopus ostralegus</i>) | | | | x |

Recent NWIS DAS data now provide full coverage of the ECC and the surrounding 2 km buffer. As a result, the Jessop et al. (2018) aerial survey dataset is no longer required for characterising this area. The updated NWIS DAS dataset offers substantially higher spatial coverage and resolution, enabling direct estimation of density and abundance across the ECC and ECC + 2 km buffer.

The baseline for the ECC is therefore now derived entirely from the NWIS DAS rather than supplemented by the Jessop et al. (2018) low-coverage aerial surveys. Table A15.5 below therefore provides the annual abundances of all species recorded within the ECC plus 2km buffer from the NWIS DAS data.

Table A15.5 Peak abundance of bird species recorded during the NWIS DAS within the ECC plus a 2 km buffer.

| Species | Corrected Abundance (ECC) | Corrected Abundance (ECC +2km buffer) |
|--------------------------|---------------------------|---------------------------------------|
| Guillemot | 2,027.6 | 4,870.8 |
| Arctic Tern | 32.0 | 44.3 |
| Black Guillemot | 5.3 | 43.0 |
| Black headed Gull | 13.5 | 81.0 |
| Brent Goose | 0.0 | 561.0 |
| Common Eider | 0.0 | 17.0 |
| Common Gull | 124.3 | 167.3 |
| Common Scoter | 1,170.5 | 1,525.4 |
| Common Tern | 214.5 | 598.0 |
| Cormorant | 19.7 | 32.5 |
| Curlew | 0.0 | 41.7 |
| Fulmar | 5.0 | 5.2 |
| Gannet | 116.8 | 186.4 |
| Great Black backed Gull | 38.8 | 81.5 |
| Great Crested Grebe | 21.8 | 33.8 |
| Great Northern Diver | 6.0 | 23.8 |
| Grey Heron | 0.0 | 9.0 |
| Herring Gull | 343.2 | 919.6 |
| Kittiwake | 154.8 | 379.8 |
| Lesser Black backed Gull | 20.0 | 25.2 |
| Little Egret | 0.0 | 10.5 |
| Little Tern | 6.0 | 17.0 |
| Manx Shearwater | 807.2 | 1,695.3 |
| Mediterranean Gull | 0.0 | 103.0 |
| Oystercatcher | 0.0 | 41.8 |
| Puffin | 28.0 | 23.0 |
| Razorbill | 1,593.8 | 3,217.8 |
| Red throated Diver | 93.1 | 159.6 |
| Redshank | 0.0 | 30.0 |

| Species | Corrected Abundance (ECC) | Corrected Abundance (ECC +2km buffer) |
|---------------|---------------------------|---------------------------------------|
| Roseate Tern | 205.0 | 655.0 |
| Sandwich Tern | 26.0 | 109.3 |
| Shag | 12.3 | 165.8 |

Seasonal bird abundance

The bio-seasons remain consistent with those presented in the 2024 EIAR. In response to RFI 8 (a) ix Further justification for the guillemot bio-seasons is provided in Appendix A15.1: Offshore and Intertidal Ornithology Technical Baseline. However, this section now includes additional detail informed by the 12 months of NWIS DAS data, as well as updates to the MRSea analysis based on the refined PFI.

The following paragraphs of Section 15.3.2 of Chapter 15 in the 2024 EIAR shall be deleted:

The DAS data clearly shows large increases in guillemots using the array area and 2km buffer from July onwards. For example, the mean abundance of guillemots calculated to be present in the core breeding season (May and June) across the three years of DAS data is 1,342 individuals, and this increases to a mean of 11,041 in July. This increase in abundance will be due to guillemots dispersing from colonies in the wider region (including a proportion from local colonies) and continues to increase as birds disperse throughout the region into e, the removal of March and July from the breeding is considered justified owing to the clear evidence that birds are not constrained by breeding behaviour during this month, with clear evidence presented in site-specific DAS data to support that numbers are inflated in July due to dispersing birds from the wider region as well as local colonies. Therefore, a season of April to June (hereafter the “project approach”) is considered most ecologically justified.

And be replaced with:

The DAS data (both the MAC DAS and NWIS DAS) clearly shows large increases in guillemot using the PFI and 2km buffer from July onwards across all survey years. For example, the mean abundance of guillemot calculated to be present in the core breeding season (May and June) across the four years of DAS data is 901 individuals, and this increases to a mean of 15,229 in July. This increase in abundance will be due to guillemot dispersing from colonies in the wider region (including a proportion from local colonies) and continues to increase as birds disperse throughout the region into August and September with mean estimated abundances in the PFI and 2km buffer of 15,511 and 15,485, respectively.

Consequently, the removal of March and July from the breeding season is considered justified owing to the clear evidence that birds are not constrained by breeding behaviour during these months. Evidence from the site-specific DAS data clearly shows that numbers are inflated in July due to dispersing birds from the wider region as well as local colonies. Therefore, the site-specific approach of a season of April to June is considered most ecologically justified.

In addition, a site-specific approach is presented for both kittiwake and razorbill. For kittiwake, a site-specific approach using the migration-free breeding season (as presented in Furness (2015)) is used, while for razorbill, the site-specific approach excludes July 2025 from the breeding season based on trends in the DAS data. For further analysis and justification on the approach to bio-seasons for all species, see Appendix A15.1: Offshore and Intertidal Ornithology Technical Baseline. Bio-seasons for all relevant species are presented in Table A15.6 below.

Table A15.6 Bio-seasons for relevant ornithological receptors used in the assessment of likely significant effects, based on Furness (2015) (replaces table 15.14 in the 2024 EIAR).

| Species | Autumn migration | Spring migration | Migration-free winter | Breeding | Non-breeding |
|-------------------------------------|------------------|------------------|-----------------------|-------------------------------|--------------|
| Common scoter | - | - | - | NA | Sep-Apr |
| Kittiwake (Furness (2015) approach) | Sep-Dec | Jan-Feb | - | Mar-Aug | - |
| Kittiwake (site-specific approach) | Jul - Dec | Jan - Mar | - | Apr-Jun | - |
| Black-headed gull | - | - | - | Apr – Aug | Sep-Mar |
| Common gull | - | - | - | Apr – Aug | Sep-Apr |
| Great black-backed gull | - | - | - | Apr-Aug | Sep-Mar |
| Herring gull | - | - | - | Mar-Aug | Sep-Feb |
| Lesser black-backed gull | Sep-Oct | Mar | Nov-Feb | Apr-Aug | - |
| Roseate tern | Sep | Apr | - | May-Aug | - |
| Common tern | Sep | Apr | - | May-Aug | - |
| Arctic tern | Sep | Apr | - | May-Aug | - |
| Guillemot (site-specific approach) | - | - | - | Apr-Jun | Jul-Mar |
| Guillemot (Furness 2015 approach) | - | - | - | Mar-Jul | Aug-Feb |
| Razorbill (site-specific approach) | Aug-Oct | Jan-Mar | Nov-Dec | Apr-Jul (excluding July 2025) | - |
| Razorbill (Furness 2015 approach) | Aug-Oct | Jan-Mar | Nov-Dec | Apr-Jul | - |
| Puffin | - | - | - | Apr-Jul | Aug-Mar |
| Red-throated diver | Sep-Nov | Feb-Apr | Dec-Jan | Mar-Aug | - |
| Great northern diver | - | - | - | NA | Sep-May |
| Fulmar | Sep-Oct | Dec | Nov | Jan-Aug | - |
| Manx shearwater | Sep-Oct | Mar | - | Apr-Aug | - |

In addition, the following paragraphs have been added:

In addition to the model-based abundance estimates previously derived for guillemot and razorbill, a further suite of MRSea analyses has now been completed using the 12-month NWIS DAS dataset (September 2024–August 2025). This expanded modelling covers a wider range of species that were recorded frequently and in sufficient numbers across multiple months, including kittiwake, herring gull, great black-backed gull, gannet, common tern, roseate tern and red-throated diver.

Full methodological details, model selection procedures and validation outputs are provided in the NISA NWIS Appendix A15.2: MRSea Modelling for Offshore Ornithology, with supporting survey information in Appendix A15.1 Offshore Ornithology Technical Baseline.

For each species, MRSea was used to generate spatially explicit distribution surfaces and model-based abundance estimates across the NWIS DAS surveyed area, with outputs clipped to the PFI and the PFI + 2 km buffer for consistency with the displacement and collision assessment ZoI. These model-based estimates complement the design-based calculations by incorporating environmental predictors and by providing improved spatial resolution across the wider NWIS cSPA. Summary abundance and density outputs for all species modelled using the 12-month dataset are presented in Section 4 of Appendix A15.2: MRSea Modelling for Offshore Ornithology, with accompanying mapped distributions. Together, these results provide a more comprehensive and up-to-date characterisation of seabird usage across the PFI, its buffers, and the ECC + 2 km buffer, directly informing this updated assessment.

For consistency across datasets, design-based abundance estimates have been used throughout the assessment, as not all species recorded in the MAC DAS dataset were modelled using MRSea. This ensures a consistent methodological basis when comparing species and seasons across the full 41-month dataset. However, where available the MRSea-derived distribution maps produced from the 12-month NWIS cSPA analyses were used alongside these estimates to provide additional spatial context, particularly in highlighting key areas of seabird concentration within and around the PFI and ECC.

Nature conservation value

There are no changes to this section. Refer to Section 15.3.2 of Chapter 15 in the 2024 EIAR.

Reference breeding and non-breeding populations

This entire section “Reference breeding and non-breeding populations” of Section 15.3.2 has been updated to reflect the requirements of RFI 8a vii, which specifies that only Method 2 should be used to derive the Regional Breeding Population. Accordingly, all breeding population estimates have used Method 2. For consistency, more recent colony count data have not been incorporated; retaining the original population baselines ensures that all estimates used in the EIA are derived from a single, coherent evidence base rather than a mixture of datasets collected at different times. In addition, updates required under RFI 8a viii have been implemented for regional populations of common gull and black-headed gull. The original text has therefore been fully replaced by the following:

Reference non-breeding populations at the regional population scale were adapted from data presented in Furness (2015). Within Furness (2015), species-specific regional populations are provided for appropriate regions surrounding Great Britain, with populations incorporating a proportion of the estimated Irish breeding population. For the purpose of this EIAR, populations in Furness (2015) were altered to reflect Irish regional populations to allow a greater weighting towards the Irish component of the regional population than is provided in Furness, and to use the most recent available data from Burnell *et al.* (2023). For this, the Irish proportion was removed from the regional populations and replaced with the east and south-east Irish breeding population as defined in Burnell *et al.*, (2023), corrected to include non-adults using season-specific age group proportions from Horswill and Robinson (2015). Full details of the approach are provided in the Technical Baseline.

To calculate breeding bio-season populations, two approaches are available, as discussed in Appendix A15.1: Offshore and Intertidal Ornithology Technical Baseline:

- Method 1: Taking colony counts of all colonies within mean maximum foraging range plus one standard deviation (SD) (based on Woodward *et al.*, 2019) and adding the number of immatures from the nonbreeding season preceding the breeding season, calculated based on the proportion of immatures from the relevant regional population (using adult proportions from Horswill and Robinson 2015); and
- Method 2: Taking colony counts of all colonies within mean maximum foraging range plus one SD (based on Woodward *et al.*, (2019) and adjusting these based on the number of immatures per adult calculated from Horswill and Robinson (2015).

The first approach (Method 1) is considered more ecologically relevant because it accounts for the breeding adult population, which are constrained by the necessity to tend to a nest (i.e. their foraging range), and the remaining regional population of immature birds and non-breeders that do not have the same constraints during the breeding season.

Evidence suggests that large proportion of these birds are likely to remain in the region and use the area for foraging during the breeding season and therefore should be considered as part of the regional population. In spite of this, in line with the requirements set out in RFI 8avii, the assessment has adopted Method 2 exclusively when deriving Regional Breeding Population estimates. This approach applies the adult-to-immature ratios from Horswill & Robinson (2015) to adjust colony counts within the relevant foraging range and is considered the more precautionary and transparent method for population estimation. Consequently, Method 2 has been used consistently throughout the EIA to ensure compliance with the RFI.

For fulmar, a slightly different approach was undertaken based on knowledge of their behaviour and expert judgement. Fulmar foraging behaviour changes radically between the incubation period and the chick rearing period. During chick rearing, fulmars are constrained by the need to return to the nest to feed young. As such, the average foraging range during this period is substantially reduced in comparison with incubation. Studies of Norwegian birds showed a chick rearing average foraging range of 60km (Weimerskirch *et al.*, 2001). Birds tracked from colonies in Orkney during chick rearing showed median ranges of 6km (males) and 5km (females), compared to median ranges of 475km (males) and 702km (females) during incubation. (Edwards 2015). Fulmar occurrence in the PFI is highest during the chick rearing period (defined as July 1 – Aug 20 in Orkney by Edwards (2015)) and into September, possibly corresponding with occurrences of locally fledged birds. As fulmar presence is so low in the PFI during the incubation period (total of 10 birds across three years in the PFI plus 4km buffer), potential impacts will be similarly low. For the chick rearing period, impacts can be assessed against colonies within a precautionary foraging range of 100km.

For common gull, the combined Herring/Common gull total for the Western Irish Sea reported in Jessop *et al.* (2018) was apportioned using species proportions derived from the NWIS DAS dataset. First, the proportion of birds recorded within the SPA was applied to correct the peak NWIS DAS abundance, producing a Western Irish Sea population estimate of 55,395 birds. This total was then divided into herring gull and common gull based on the species ratios observed in the NWIS DAS, resulting in an estimated 11,030 common gulls. This represents the best available evidence and closely aligns with the figures used for Dublin Array OWF of 10,242 (SLR Consulting & GoBe Consultants, 2025).

For black-headed gull the NWIS cSPA peak abundance from the DAS programme was used, to provide a population of 3,709. For common scoter the peak NWIS cSPA count of 21,387 was used based on the 2024/2025 DAS campaign. While, for red-throated diver and great northern diver, the Irish component was based on aerial survey data in Jessop *et al.*, (2018) as data was not available in Burnell *et al.*, (2023). A full description of relevant breeding and non-breeding populations is provided in Appendix A15.1: Offshore and Intertidal Ornithology Technical Baseline.

For each species, a biogeographic population is also provided based on Furness (2015), representing the total number of birds which have connectivity to UK and Irish waters.

Table A15.7 Ornithology reference breeding and non-breeding populations (replaces Table 15.17 of the 2024 EIAR).

| Species | Regional population | | | | | | |
|-------------------------|---------------------|---------------------|-----------------|------------------|------------------|-----------------------|---------------|
| | Breeding (Method 1) | Breeding (Method 2) | Non-breeding | Autumn migration | Spring migration | Migration-free winter | Biogeographic |
| Common scoter | - | - | 21,387 | - | - | - | 550,000 |
| Kittiwake | 412,374 | 142,464 | - | 933,197 | 713,137 | - | 5,100,000 |
| Black-headed gull | 32,000 | - | 100,000 & 3,709 | - | - | - | 4,250,000 |
| Common gull | - | - | 67,500 & 11,030 | - | - | - | 525,000 |
| Great black-backed gull | 33,422 | 2,685 | 53,406 | - | - | - | 235,000 |
| Herring gull | 119,304 | 26,459 | 187,094 | - | 103,941 | 186,502 | 1,098,000 |

| Species | Regional population | | | | | | |
|--------------------------|---------------------|----------------------|---------------------|-----------|-----------|---------|------------|
| Lesser black-backed gull | 120,320 | 75,470 | - | 171,500 | 171,500 | 53,368 | 864,000 |
| Roseate tern | 5,911 | 5,586 | - | 6,375 | 6,375 | - | 2,900 |
| Common tern | 34,574 | 6,949 | - | 74,000 | 74,000 | - | 480,000 |
| Arctic tern | 24,532 | 178 | - | 72,231 | 72,231 | - | 628,000 |
| Guillemot | 736,212 | 190,073 | 1,332,623 & 465,111 | - | - | - | 4,125,000 |
| Razorbill | 321,633 | 49,298 | - | 632,453 | 632,453 | 366,961 | 1,707,000 |
| Puffin | 180,693 | 79,939 | 300,427 | - | - | - | 11,840,000 |
| Red-throated diver | - | - | - | 12,717 | 12,717 | 4,148 | 27,000 |
| Great northern diver | - | - | 871 | - | - | - | 430,000 |
| Fulmar | 441,767 | 6,249 | | 843,783 | 843,783 | 571,956 | |
| Manx shearwater | 2,121,049 | 2,727,371 | - | 1,585,521 | 1,585,521 | - | 2,000,000 |
| Gannet | 637,440 | 632,514 | 596,525 | 535,183 | 643,917 | - | 1,180,000 |

There are no other changes required to “*Reference breeding and non-breeding populations*” in this section. Refer to Section 15.3.2 of the 2024 EIAR.

Baseline mortality rates

In response to RFI 1(b), this section ‘*Baseline Mortality Rates*’ has been updated to reflect the revised average mortality rates now advised for UK offshore wind projects (e.g., Morecambe OWF⁴) by Natural England and Natural Resources Wales. For clarity and simplicity, Table 15.18 has also been streamlined to only present the average mortality values within that guidance and has been replaced with Table A15.8.

The following paragraphs of the Section 15.3.2 of Chapter 15 in the 2024 EIAR shall be deleted:

To assess the impacts of wind farms on ornithological receptors, the impact of additional mortality as a result of the proposed development is assessed relative to the baseline mortality rate, as is standard in assessments across other projects (e.g., UK projects) and an agreed method across Phase One projects. It is assumed that the risk of effects is equal across all age classes, with each age class affected in proportion to its presence in the population. Therefore, for all species screened in for assessment, a weighted average baseline mortality rate has been calculated which is appropriate for all age classes. These were calculated using the different mortality rates for each age class and their relative proportions in the population. Only those species for which impacts have been assessed (i.e. those scoped in for specific impacts in Section 15.5) have been included.

Demographic rates for each species were taken from Horswill and Robinson (2015) and entered into a matrix population model. This was used to calculate the expected stable proportions in each age class (note, to obtain robust stable age class distributions for less well studied species such as divers it was necessary to

⁴ <https://nqip-documents.planninginspectorate.gov.uk/published-documents/EN010136-000269-NE%20Relevant%20Reps%20and%20Written%20Representations%20Letter.pdf>

adjust the rates in order to obtain a stable population size). Each age class survival rate was multiplied by its stable age proportion and the total for all ages summed to give the weighted average survival rate for all ages. Taking this value from 1 gives the average mortality rate. The demographic rates, and the age class proportions, and average mortality rates calculated from them, are presented in Table 15-7 Table A15.8.

For great black-backed gull, the 0-1 survival is not provided in Horswill and Robinson (2015), and therefore the rate is taken from herring gull due to their similar life history strategies. This approach is recommended by Horswill and Robinson (2015) and has been agreed within the Irish Phase one Methodology Statement'. Similarly, information on roseate tern is not provided in Horswill and Robinson (2015), and therefore demographic data is taken from common tern for the same reason.

And replaced with:

To assess the impacts of wind farms on ornithological receptors, the impact of additional mortality as a result of the proposed development is assessed relative to the baseline mortality rate, as is standard in assessments across other projects (e.g., UK projects) and is an agreed method across Phase One projects. It is assumed that the risk of effects is equal across all age classes, with each age class affected in proportion to its presence in the population. Therefore, for all species screened in for assessment, a weighted average baseline mortality rate has been calculated which is appropriate for all age classes. These were calculated using the different mortality rates for each age class and their relative proportions in the population. Only those species for which impacts have been assessed (i.e. those scoped in for specific impacts in Section 15.5) have been included.

Demographic rates for each species were taken from Horswill and Robinson (2015) and entered into a matrix population model. This was used to calculate the expected stable proportions in each age class (note, to obtain robust stable age class distributions for less well studied species such as divers it was necessary to adjust the rates in order to obtain a stable population size). Each age class survival rate was multiplied by its stable age proportion and the total for all ages summed to give the weighted average survival rate for all ages. Taking this value from 1 gives the average mortality rate. The demographic rates, and the age class proportions, and average mortality rates calculated from them, are presented in Table A15.8. Average mortality rates used are in line with recent advice from Natural England and Natural Resources Wales given to UK projects including Morgan OWF, Mona OWF and Morecambe OWF (submitted within Nature England’s relevant representation to Morecambe OWF (Natural England, 2024), accounting for errors in values used for some species across previous projects.

For great black-backed gull, the 0-1 survival is not provided in Horswill and Robinson (2015), and therefore the rate is taken from herring gull due to their similar life history strategies. This approach is recommended by Horswill and Robinson (2015). Similarly, information on roseate tern is not provided in Horswill and Robinson (2015), and therefore demographic data is taken from common tern for the same reason.

Table A15.8 Average mortality rates of relevant seabirds across all age classes, calculated using age specific demographic rates and age class proportions (replaces Table 15.18 of the 2024 EIAR).

| Species | Average mortality |
|--------------------------|-------------------|
| Common scoter | 0.228 |
| Kittiwake | 0.158 |
| Black-headed gull | 0.175 |
| Little gull | 0.200 |
| Common gull | 0.253 |
| Great black-backed gull | 0.097 |
| Herring gull | 0.172 |
| Lesser black-backed gull | 0.124 |
| Roseate tern | 0.173 |
| Common tern | 0.173 |
| Arctic tern | 0.163 |
| Guillemot | 0.141 |

| Species | Average mortality |
|----------------------|-------------------|
| Razorbill | 0.130 |
| Puffin | 0.119 |
| Red-throated diver | 0.228 |
| Great northern diver | 0.161 |
| Manx shearwater | 0.130 |
| Fulmar | 0.111 |
| Gannet | 0.187 |

There are no other changes required to the ‘*Baseline Mortality Rates*’ section. Refer to Section 15.3.2 of Chapter 15 in the 2024 EIAR.

15.3.3 Intertidal Ornithology

There are no changes to this Section other than wader species sensitivity and disturbance distances in selected Scottish bird species is now informed by NatureScot guidance based on an updated review of empirical evidence (Goodship & Furness, 2022).

There are no other changes to this section. Refer to Section 15.3.3 of Chapter 15 in the 2024 EIAR.

15.4 Characteristics of the Proposed Development

The change required in this section is in response to the refinement of the foundation types for Project Option 1 and Project Option 2. Further information on the design refinements made in response to the RFI, third-party submissions and the continued public and stakeholder consultation is found within Appendix A5.1 Design Refinements.

In the 2024 EIAR, WTG monopile and jacket foundations with pin piles and Offshore Substation Platform (OSP) monopile and jacket foundations with pin piles were considered. Following design refinements in response to the RFI, monopiles have been removed. WTGs are now proposed with Suction Bucket Jacket (SBJ) foundations, and the OSP with a jacket foundation installed with either drilled pin piles or suction buckets, as indicated by the grey shading in Table A15.11 below. Therefore, Table 15-19 and 15-21 of Chapter 13 in the 2024 EIAR shall be deleted and replaced with Table A15.9 and Table A15.11.

Furthermore, the introduction of the PFI has meant that an additional key characteristic has been added to Table A15.9 and Table A15.11. There are no other amendments to this section.

Table A15.9 Key characteristics of Project Option 1 and Project Option 2 relevant to offshore and intertidal ornithological receptors (replaces Table 15.19 of Chapter 15 of the 2024 EIAR).

| Key Offshore Characteristics | Project Option 1 | Project Option 2 |
|--|---|--|
| Landfall | One landfall site, immediately south of Bremore Point which includes two exit pits offshore | One landfall site, immediately south of Bremore Point, which includes two exit pits offshore |
| Array area | 88.5km ² | 88.5km ² |
| PFI | 57.7km ² | 57.7km ² |
| ECC | 36.45km ² | 36.45km ² |
| Wind Turbine Generator (WTG) | 49 WTGs with 250m rotor diameter | 35 WTGs with 276m rotor diameter |
| WTG Foundations | 49 SBJs | 35 SBJs |
| Offshore Substation Platform (OSP) Foundations (array) | One OSP, with a four-legged jacket foundation with pin piles or suction buckets | One OSP, with a four-legged jacket foundation with pin piles or suction buckets |

| Key Offshore Characteristics | Project Option 1 | Project Option 2 |
|------------------------------|---|--|
| Cables | Installation of 111km of array cables and installation of two 18km export cables within the ECC | Installation of 91km of array cables and installation of two 18km export cables within the ECC |

15.4.1 Parameters for assessment

There are no changes required to this section. Refer to Section 15.4.1 of Chapter 15 in the 2024 EIAR.

15.4.2 Construction

There are no changes required to this section. Refer to Section 15.4.2 of Chapter 15 in the 2024 EIAR.

15.4.3 Operational phase

There are no changes required to this section. Refer to Section 15.4.3 of Chapter 15 in the 2024 EIAR.

15.4.4 Decommissioning

There are no changes required to this section. Refer to Section 15.4.4 of Chapter 15 in the 2024 EIAR.

15.4.5 Embedded Mitigation Measures

Due to the refinement and reduction of the footprint of the fixed WTG layouts for Project Option 1 and Project Option 2 an additional row has been added to Table A 15-10. There are no further amendments to this section.

Table A15.10 Embedded mitigation measures relating to offshore and intertidal ornithological receptors (replaces Table 15.10 of Chapter 15 of the 2024 EIAR)

| Measure | Mitigation detail |
|---|--|
| Refinement and reduction in the offshore development area | <p>Refinements in the offshore development area from the extent of the original MAC boundary (as outlined in the Alternatives Chapter) were undertaken to avoid key areas for birds (e.g., avoidance of density hotspots that may indicate key foraging areas where possible, alongside avoidance of breeding colonies and migration corridors where possible). Reducing the extent of the offshore development area also increases distance from Rockabill Island and Lambay Island which leads to a considerable reduction in interaction with bird species that inhabit these SPA colonies.</p> <p>There has been a considerable reduction in the size of the array area from the original MAC boundary. This process considered hotspots of auks, the most abundant species within the survey area, using species heatmaps from raw observations and a modelled approach using MRSea (MRSea Modelling Report). The results of this modelling clearly show high densities of guillemots and razorbills in proximity to Lambay Island during the breeding season. During this time the densities of birds within the array area are comparatively low. Outside of the breeding season there are no clear hotspots throughout the survey area (MAC boundary plus 4km buffer).</p> <p>This process was undertaken for the proposed development, with the array area of the proposed development being reduced by more than 60% from the MAC boundary of 195.9km² to the refined array area of 88.5km².</p> |
| Reduction in WTG Footprint | <p>The design process has refined and reduced the footprint of the fixed WTG layouts for Project Option 1 and Project Option 2 to reduce the spatial extent of the offshore infrastructure within the NWIS cSPA. The footprint of the WTGs with 500m Limit of Deviation (LOD) within the array area has reduced the area of overlap (in terms of area of potential displacement for Common Guillemot, which includes a 2km buffer around the array area) from 8.5% to 6.9% of the NWIS cSPA.</p> |
| Increase in air draft | <p>The design has increased the WTG air draft, which reduces the collision risk to key vulnerable ornithological receptors by reducing the rotor swept area that is at collision risk height.</p> <p>All turbines in Project Option 1 will have minimum air draft of 40m LAT. Turbines in Project Option 2 will have a minimum air draft of 40m LAT except where they are in the aviation restriction zone where the air draft will be 35m LAT.</p> <p>The number of birds at collision risk height at 40m is considerably reduced compared to 22m. For example, the number of common tern flying at collision risk height is reduced by 90.6% between 22m and 40m. Likewise, kittiwake have a reduction of birds at collision risk height of 82.2% between 22m and 40m, and gulls show a reduction of roughly 65%.</p> |

| Measure | Mitigation detail |
|--|--|
| Lighting design | Lighting design will avoid lighting levels that exceed those required to comply with navigational safety, aviation, emergency procedures and general activity to reduce the risk of WTG and OSP lighting attracting birds during periods of bad weather or at night. This measure will be provided as part of the Lighting Management Plan (LMP). |
| Standard pollution and waste management | Each WTG will be equipped with sensors to enable early detection of fluids and leaks. Spill kits will also be located on each WTG to contain any fluids in the unlikely event of pollutant release. Pollution and waste management is considered within Appendix A6.1: Offshore Environmental Management Plan (EMP; hereafter the Offshore EMP). |
| Assessment of impacts and best practice environmental management | Prior to decommissioning a study of the potential environmental impacts to fish and shellfish receptors from the proposed decommissioning activities would be undertaken, considering the baseline environment at the pre-decommissioning stage. All mitigation measures to be captured would be captured within the Rehabilitation Schedule. Any licences or authorisations that might be required would be identified and obtained prior to decommissioning, including any validation, updating or new submission of an EIAR, as required. |

15.4.6 Potential Impacts

Due to design refinements for both Project Option 1 and 2, Table 15.21 has been updated and is replaced with Table A15-11. New and updated information considered in this assessment is indicated by the grey shading in Table A15-11.

Table A15.11 Potential impacts and magnitude of impact per project option. The project option that has the greatest magnitude of impact is identified in blue (replaces Table 15.21 of Chapter 15 of the EIAR).

| Potential impact | Project Option 1 (49 WTG) | Project Option 2 (35 WTG) | Rationale for the project option with the greatest magnitude of impact |
|--|--|---|---|
| Construction | | | |
| 1. Disturbance and displacement | <p>Construction duration:</p> <ul style="list-style-type: none"> Approximately 3 years. <p>Array area:</p> <ul style="list-style-type: none"> Array area size of 88.5km²; and PFI size of 57.7km². <p>Vessel activity (WTG Installation):</p> <ul style="list-style-type: none"> 2 installation vessels; 6 personnel support vessels; 2 component transport vessels; and 1 support helicopter. <p>Vessel activity (Cable Installation -Array)</p> <ul style="list-style-type: none"> 1 main laying vessel; 1 main burial vessel; 1 personnel support vessel; and 1 component transport vessel. <p>ECC area:</p> <ul style="list-style-type: none"> ECC area of 36.45km². <p>Vessel activity (ECC installation):</p> <ul style="list-style-type: none"> 1 main laying vessel; 1 main burial vessel; 1 main support vessel; 12 work boats/Rigid Inflatable Boat (RIBs); 1 work boat for landfall HDD installation; 1 small JUV for landfall HDD installation; and 1 guard vessel for HDD and cable installation. | <p>Construction duration:</p> <ul style="list-style-type: none"> Approximately 3 years. <p>Array Area:</p> <ul style="list-style-type: none"> Array area size of 88.5km²; and PFI size of 57.7km²; <p>Vessel activity (WTG Installation):</p> <ul style="list-style-type: none"> 2 installation vessels; 6 personnel support vessels; 2 component transport vessels; and 1 support helicopter. <p>Vessel activity (Cable Installation - Array):</p> <ul style="list-style-type: none"> 1 main laying vessel; 1 main burial vessel; 1 personnel support vessel; and 1 component transport vessel. <p>ECC area:</p> <ul style="list-style-type: none"> ECC area of 36.45km² <p>Vessel activity (ECC installation):</p> <ul style="list-style-type: none"> 1 main laying vessel; 1 main burial vessel; 1 main support vessel; 12 work boats/RIBs; 1 work boat for intertidal HDD installation; 1 small JUV for intertidal HDD installation; and 1 guard vessel for HDD and cable installation. | <p>Both project options have the same magnitude of impact with regard to the number of vessels present for displacement impacts in the ECC, and the size of the PFI for displacement due to presence of offshore infrastructure.</p> |
| 2. Indirect impacts due to impacts on prey | See Potential Impacts table for Fish and Shellfish and Benthic Ecology chapters. | See Potential Impacts table for Fish and Shellfish and Benthic Ecology chapters. | Project Option with greatest Magnitude varies across different impact types on fish and shellfish. |

| Potential impact | Project Option 1 (49 WTG) | Project Option 2 (35 WTG) | Rationale for the project option with the greatest magnitude of impact |
|---|---|---|--|
| 3. Indirect impacts due to accidental pollution | <p>WTGs infrastructure presence: installation of 49 WTGs.</p> <p>Each WTG will contain components that require lubricating oils, hydraulic oils and coolants for operations such as grease, synthetic oil, nitrogen, transformer oil, sulphur hexafluoride (SF6) and glycerol. The volume of oils and fluids will vary depending on the WTG design.</p> <p>The OSP will contain diesel for the emergency diesel generators contained in tanks, oil for transformers, deionised water for cooling systems, glycol, lead acid for UPS and batteries, engine oil and SF6.</p> <p>A maximum of 3,032 return vessel trips will occur during construction activities⁵.</p> | <p>WTGs infrastructure presence: installation of 35 WTGs.</p> <p>Each WTG will contain components that require lubricating oils, hydraulic oils and coolants for operations such as grease, synthetic oil, nitrogen, transformer oil, sulphur hexafluoride (SF6) and glycerol. The volume of oils and fluids will vary depending on the WTG design.</p> <p>The OSP will contain diesel for the emergency diesel generators contained in tanks, oil for transformers, deionised water for cooling systems, glycol, lead acid for UPS and batteries, engine oil and SF6.</p> <p>A maximum of 2,504 return vessel trips will occur during construction activities.</p> | <p>Project Option 1 presents the greatest magnitude of impact with regards to vessel movement during the construction period.</p> <p>These parameters present the greatest volumes of compounds which could be associated with the proposed development infrastructure.</p> |
| 4. Impacts arising from artificial light | <p>Artificial lighting will be used continuously during HDD drilling activities.</p> <p>During construction, temporary lighting will be used to mark any surface piercing structures and will have a 2.5 second yellow flash visible for at least 2nm with a 360-degree visibility.</p> | <p>Artificial lighting will be used continuously during HDD drilling activities.</p> <p>During construction, temporary lighting will be used to mark any surface piercing structures and will have a 2.5 second yellow flash visible for at least 2nm with a 360-degree visibility.</p> | <p>Project Option 1 is considered to have a greater magnitude of impact due to the higher number of surface piercing structures.</p> |
| Operation | | | |
| 5. Disturbance and displacement (array area) | <p>Array</p> <ul style="list-style-type: none"> • Array area size of 88.5km² • PFI area size of 57.7km² <p>WTGs infrastructure presence:</p> <ul style="list-style-type: none"> • Operation of 49 WTGs <p>Vessel activity (O&M Vessels):</p> <ul style="list-style-type: none"> • 1 JUV; • 1 SOV; • 1 CTV; • 1 lift vessels; | <p>Array</p> <ul style="list-style-type: none"> • Array area size of 88.5km² • PFI area size of 57.7km² <p>WTGs infrastructure presence:</p> <ul style="list-style-type: none"> • Operation of 35 WTGs <p>Vessel activity (O&M Vessels):</p> <ul style="list-style-type: none"> • 1 JUV; • 1 SOV; • 1 CTV; • 1 lift vessels; | <p>Both project options have the same magnitude of impact based on the displacement assessment, which is based on the size of the development area which is the same across both options.</p> |

⁵ In the 2024 EIAR, WTG monopile and jacket foundations with pin piles and Offshore Substation Platform (OSP) monopile and jacket foundations with pin piles were considered. Following design refinements in response to the RFI, monopiles have been removed. WTGs are now proposed with Suction Bucket Jacket (SBJ) foundations, and the OSP with a jacket foundation installed with either drilled pin piles or suction buckets. These changes have necessitated an increase in the number of vessel trips proposed in the 2024 EIAR.

| Potential impact | Project Option 1 (49 WTG) | Project Option 2 (35 WTG) | Rationale for the project option with the greatest magnitude of impact |
|---|--|---|---|
| | <ul style="list-style-type: none"> 1 cable vessels; and 7 aux vessels. | <ul style="list-style-type: none"> 1 cable vessels; and 7 aux vessels. | |
| 6. Collision risk | <p>WTGs infrastructure presence:</p> <ul style="list-style-type: none"> Operation of 49 WTGs; Air draft 40m (LAT); Rotor diameter 250m; Blade width 7m; and Rotor max rotational speed 8.3m/s. | <p>WTGs infrastructure presence:</p> <ul style="list-style-type: none"> Operation of 35 WTGs; 8 WTGs with an air draft 35m (LAT); 27 WTGs with an air draft 40m (LAT); Rotor diameter 276m; Blade width 7.5m; and Rotor max rotational speed 7.5m/s. | <p>CRM was run for both project options.</p> <p>The project option with the greatest magnitude of impact based on the CRM assessment was predominantly Option 1 for most species, with the exception of Arctic tern. Results for both options are presented in the Appendix A15.3: Offshore Ornithology Collision Risk Modelling Assessment.</p> |
| 7. Combined collision risk and displacement risk (gannet) | <p>Array area: Array area size of 88.5km² PFI size of 57.7km²</p> <p>WTGs infrastructure presence:</p> <ul style="list-style-type: none"> Operation of 49 WTGs ; Air draft 40m (LAT); Rotor diameter 250m; Blade width 7m; and Rotor max rotational speed 8.3m/s. | <p>Array area: Array area size of 88.5km² PFI size of 57.7km²</p> <p>WTGs infrastructure presence:</p> <ul style="list-style-type: none"> Operation of 35 WTGs; 8 WTGs with an air draft 35m (LAT); 27 WTGs with an air draft of 40m (LAT); Rotor diameter 276m; Blade width 7.5m; and Rotor max rotational speed 7.5m/s. | <p>This impact is assessed only for gannet. The CRM was run for both project Options 1 and 2.</p> <p>Project Option 1 has the greatest magnitude of impact for collision impacts (with no differences between Options 1 and 2 for displacement impacts).</p> |
| 8. Migratory collision risk | <p>WTGs infrastructure presence:</p> <ul style="list-style-type: none"> Operation of 49 WTGs; Air draft 40m (LAT); Rotor diameter 250m; Blade width 7m; and Rotor max rotational speed 8.3m/s. | <p>WTGs infrastructure presence:</p> <ul style="list-style-type: none"> Operation of 35 WTGs; 8 WTGs with an air draft 35m (LAT); 27 WTGs with an air draft of 40m (LAT); Rotor diameter 276m; Blade width 7.5m; and Rotor max rotational speed 7.5m/s. | <p>Project Option 1 is the project option with the greatest magnitude of impact for migratory collision risk.</p> |
| 9. Indirect impacts due to impacts on prey | See Potential Impacts table for Fish and Shellfish Chapter. | See Potential Impacts table for Fish and Shellfish Chapter. | The project Option with the greatest magnitude varies across different impact types on fish and shellfish. |
| 10. Impacts arising from artificial light | Artificial lighting will be used continuously in the form of marking lights on selected periphery WTGs. | Artificial lighting will be used continuously in the form of marking lights on selected periphery WTGs. | Project Option 1 is considered to have a greater magnitude of impact due to the higher number of WTGs, and therefore lights. |

| Potential impact | Project Option 1 (49 WTG) | Project Option 2 (35 WTG) | Rationale for the project option with the greatest magnitude of impact |
|---|--|--|--|
| | Lighting will be in the form of a synchronised 5 second yellow flashing light with 360 degree visibility and located between 6m and 30m (HAT). | Lighting will be in the form of a synchronised 5 second yellow flashing light with 360 degree visibility and located between 6m and 30m (HAT). | |
| Decommissioning | | | |
| 11. Disturbance and displacement in the PFI and ECC | The greatest potential for a likely significant effect is identical (or less) to that of the construction phase. | The greatest potential for a likely significant effect is identical (or less) to that of the construction phase. | Equal magnitude of impact across both options. |
| 12. Indirect impacts due to impacts on prey | See Potential Impacts table for Fish and Shellfish and Benthic Ecology. | See Potential Impacts table for Fish and Shellfish and Benthic Ecology. | Project Option with greatest magnitude varies across different impact types on fish and shellfish. |
| 13. Indirect impacts due to accidental pollution | The greatest potential for a likely significant effect is identical (or less) to that of the construction phase. | The greatest potential for a likely significant effect is identical (or less) to that of the construction phase. | Equal magnitude of impact across both project options. |
| 14. Impacts arising from artificial light | Artificial lighting will be used continuously during HDD drilling activities. During construction, temporary lighting will be used to mark any surface piercing structures and will have a 2.5 second yellow flash visible for at least 2nm with a 360-degree visibility. | Artificial lighting will be used continuously during HDD drilling activities. During construction, temporary lighting will be used to mark any surface piercing structures and will have a 2.5 second yellow flash visible for at least 2nm with a 360-degree visibility. | Project Option 1 is considered to have a greater magnitude of impact due to the higher number of surface piercing structures. |

There are no other changes required to this section. Refer to Section 15.4.6 of Chapter 15 in the 2024 EIAR.

15.5 Potential Effects

There are no updates to the upfront text of Section 15.5 of Chapter 15 in the 2024 EIAR.

15.5.1 Do-nothing Scenario

There are no changes to this section. Refer to Section 15.5.1 of Chapter 15 in the 2024 EIAR.

15.5.2 Construction Phase

15.5.2.1 Impact 1: Disturbance and displacement

This section has been updated to reflect the inclusion of the additional NWIS DAS surveys, which now provide full coverage of the PFI, the PFI + 10 km buffer, and the entire ECC +2km. This expanded dataset was collected in direct response to RFI(8aii) and RFI (8aiii), which required expanded DAS data for red-throated diver, and 8(evi) for guillemot spatial distribution within the NWIS cSPA.

As the introduction of the PFI and the expanded DAS dataset affects species abundances and densities, all numerical values within this section have been updated accordingly. Therefore, Section 15.5.2.1 should be considered a full replacement of the equivalent text presented in Chapter 15 in the 2024 EIAR.

During construction of the proposed development, disturbance and subsequent displacement of seabirds may be caused by a range of drivers, including vessel movements (both construction and personnel), WTG construction activities as well as the physical presence of constructed WTGs, which may cause a displacement response. This impact may be present across both the PFI, and in the offshore and intertidal ECC.

Construction-phase impact assessment is referenced to the PFI, notwithstanding that some temporary works and vessel activity may occur within the wider array area. Displacement and disturbance are assessed using bird abundance within the PFI plus an appropriate buffer (typically PFI + 2 km for seabirds, and larger buffers for seaducks and divers). This buffer is defined to encompass the ZoI of construction activities, including disturbance from vessels operating both within and immediately beyond the PFI. As such, any additional, transient disturbance outside the PFI is captured within the applied buffers. The PFI represents the maximum extent of WTGs and OSP and the primary source of disturbance, while activities outside it are temporary and spatially limited. This approach therefore provides a robust and proportionate basis for assessment.

As outlined in Table A15.11 the duration of construction is approximately up to 3 years, overlapping with a maximum of four breeding seasons, four winter periods, and up to four migration periods. Notably construction activity will not be undertaken across the whole array area simultaneously or on every day but will be phased, with a maximum of one foundation expected to be placed at any one time. Therefore, the effects will be spatially and temporally limited, occurring only in the vicinity of vessels operating at any given point and not across the entire offshore development area.

The susceptibility of birds to displacement is variable across different species. Fulmar, gannet and gulls are not considered susceptible to disturbance since they are often associated with fishing boats (e.g. Camphuysen 1995; Hüppop and Wurm 2000), and have also been noted in association with both construction vessels at the Greater Gabbard OWF (GGOWL 2011) and close to active foundation piling activity at the Egmond aan Zee (OWEZ) wind farm, where they showed no noticeable reactions to the works (Leopold and Camphuysen 2007). However, auk and diver species have all been shown to exhibit behavioural responses to OWF activities and may be displaced as a consequence (Dierschke *et al.*, 2017).

The displacement assessment for both the PFI and the ECC is based on 41 months of project-specific DAS data collected for the proposed development. Assessments of the PFI plus the relevant buffer use a combined dataset comprising the MAC DAS and the NWIS DAS. For impacts with a ZoI extending beyond 4 km, only the NWIS DAS dataset was used, as the MAC DAS does not provide spatial coverage beyond this distance.

A screening exercise was undertaken to identify species most likely to be at risk of effects from disturbance and displacement in the PFI, presented in Table A15.11 below. The screening exercise considered both the relative abundance of species recorded within the PFI and the appropriate buffer distances, as well as each species' vulnerability to disturbance and displacement. A 2km buffer is standard for most seabirds. A 4km buffer is applied for divers and seaducks, while a 10km buffer is required specifically for red-throated diver. Accordingly, abundance within the PFI plus 2km buffer is used for all species except red-throated diver, great northern diver and common scoter, for which abundance within the PFI plus the relevant 4km or 10km buffer is considered. This approach is consistent across both Natural England and NatureScot guidance. Generally, low frequency refers to species present within the array area plus relevant buffer on only one or a low number (based on expert judgement on a case-by-case basis) of occasions during the survey programme. Medium frequency was used to describe species routinely present in the array area plus relevant buffer during a particular season, or with patchy abundance across multiple seasons, whilst the high frequency descriptor was reserved for species recorded in the array area plus relevant buffer on most or all surveys.

The vulnerability of species to disturbance and displacement in relation to activity during the construction phase (as defined in Table 15.4 of the 2024 EIAR) is presented for each species in Table A15.12 below, with the vulnerability for each species based on a range of available data sources (e.g. Bradbury *et al.*, 2014; Garthe and Hüppop, 2004; Furness and Wade, 2012, Wade *et al.*, 2016, Dierschke *et al.*, 2016). Species were screened out of the assessment if they had a low vulnerability to disturbance and displacement and/or a low relative abundance/frequency in the PFI plus relevant buffer. As a precautionary approach, the following species were an exception to this rule:

- Manx shearwater – although considered to have low sensitivity to displacement impacts, Manx shearwater has been included due to its designation in the NWIS cSPA in which the proposed development is located;
- Gannet – although generally considered to have low sensitivity, studies show variable results (e.g., Dierschke *et al.* (2016) suggesting higher vulnerability. However, gannet has a low habitat specialisation (e.g., Bradbury *et al.* 2014) and a large foraging range (Woodward *et al.* 2019) and therefore, though they show high avoidance of OWFs, the consequences in terms of mortality are considered low. Therefore, gannet is included with a precautionary vulnerability of medium;
- Puffin – although puffin were only recorded in low numbers and are considered to be of relatively low sensitivity to displacement impacts, they have also been included as a precautionary approach. This is due to their inclusion in several assessments within the Irish Sea (e.g., Awel y Mor), and due to the recommendation by both Natural England and NatureScot that this species should be included in displacement assessments in English and Scottish projects; and
- Kittiwake – although kittiwake are generally considered to have low sensitivity to disturbance and displacement, and are not routinely assessed for this impact in UK projects, they have been included here in response to the RFI 8cii, which specifically requested that kittiwake be assessed due to the proximity of the proposed development to the coast and nearby breeding colonies.

The same screening exercise was carried out for species recorded in the offshore ECC, presented in Table A15.13 below. The relevant study area is the ECC +2km buffer only.

Table A15.12 Screening of seabird species recorded within the PFI plus 2km buffer, divers and seabirds within 4km buffer and red-throated diver in 10km buffer for risk of disturbance and displacement during the construction phase (replaces Table 15.22 of Chapter 15 of the 2024 EIAR).

| Bird species | Vulnerability to disturbance and displacement (based on Bradbury et al., 2014; Dierschke et al., 2016) | Estimated peak abundance in the PFI plus relevant buffer (individuals) | Frequency of presence in PFI plus 2km buffer ¹² (months recorded out of 29) | Relative abundance/density in the PFI plus 2km buffer | Screening outcome |
|--------------------------|--|--|--|---|-------------------|
| Whimbrel | Low | 0 | 0 | Low | Out |
| Kittiwake | Low | 2,708 | 40 | High | Out |
| Black-headed gull | Low | 23 | 4 | Low | Out |
| Little gull | Low | 0 | 0 | Low | Out |
| Common gull | Low | 181 | 16 | Low | Out |
| Great black-backed gull | Negligible | 338 | 34 | Medium | Out |
| Herring gull | Negligible | 3,055 | 37 | High | Out |
| Lesser black-backed gull | Negligible | 246 | 5 | Low | Out |
| Sandwich tern | Low | 5 | 1 | Low | Out |
| Roseate tern | Low | 702 | 10 | Medium | Out |
| Common tern | Low | 282 | 7 | Medium | Out |
| Arctic tern | Low | 616 | 7 | Medium | Out |
| Great skua | Low | 5 | 1 | Low | Out |
| Arctic skua | Low | 0 | 0 | Low | Out |
| Guillemot | Medium | 43,430 | 41 | High | In |
| Razorbill | Medium | 16,207 | 39 | High | In |
| Black guillemot | Medium | 11 | 6 | Low | Out |
| Puffin | Low to medium | 53 | 13 | Low | In |
| Red-throated diver | High | 14 | 5 | Low | Out |
| Great northern diver | High | 17 | 3 | Low | Out |
| Fulmar | Low | 15 | 23 | Low | Out |
| Sooty shearwater | Low | 5 | 2 | Low | Out |
| Manx shearwater | Low | 9,176 | 25 | High | In |
| Gannet | Low to medium | 604 | 35 | Medium | In |
| Shag | Negligible | 3 | 1 | Low | Out |

Table A15.13 Screening of seabird species recorded within the ECC and 2km buffer for risk of disturbance and displacement during the construction phase (replaces Table 15.23 of Chapter 15 of the 2024 EIAR).

| Species | Vulnerability to disturbance and displacement (based on Bradbury et al., 2014; Dierschke et al., 2016) | Corrected abundance in ECC plus 2km buffer | Screening outcome |
|--------------------------|--|--|-------------------|
| Velvet scoter | High | Low (0) | Out |
| Common scoter | High | High (1,525) | In |
| Kittiwake | Low | Medium (380) | Out |
| Black-headed gull | Low | Medium (81) | Out |
| Great black-backed gull | Low | Low (82) | Out |
| Herring gull | Low | Medium (920) | Out |
| Common gull | Low | Low (167) | Out |
| Lesser black-backed gull | Low | Low (25) | Out |
| Great black-backed gull | Low | Low (82) | Out |
| Sandwich tern | Low | Low (109) | Out |
| Little tern | Low | Low (17) | Out |
| Roseate tern | Low | Medium (655) | Out |
| Common tern | Low | High (598) | Out |
| Arctic tern | Low | Low (44) | Out |
| Razorbill | Medium | High (3,218) | Out ⁶ |
| Guillemot | Medium | High (4,871) | Out |
| Red throated diver | High | Low (160) | In |
| Great northern diver | High | Low (24) | In |
| Fulmar | Low | Low (5) | Out |
| Manx shearwater | Low | Medium (1,695) | Out |
| Gannet | Low to medium | Low (186) | Out |
| Cormorant | Low | Low (33) | Out |
| Shag | Low | Low (166) | Out |

Based on the above screening exercise, guillemot, razorbill, puffin, Manx shearwater, gannet and red-throated diver have been screened in for the PFI, and red-throated diver, great northern diver and common scoter for the ECC, owing to their sensitivity to disturbance and displacement and/or their high frequency and/or abundance in the relevant study areas.

⁶ Screened out as not identified to species level therefore relative abundance is low when considering apportioning to species level, and the assessment in the PFI is considered to appropriately cover any potential displacement risk to both these species.

It is recognised that assessment of these species during the construction phase will result in lower levels of displacement compared with the operational phase. This is due to:

- Construction activities being undertaken predominantly within discrete localised areas of the PFI at any one time, meaning that displacement impacts will have a considerably smaller footprint, and therefore act on fewer birds, than during the operational phase;
- Only a proportion of the WTG array will be constructed and therefore there will be less infrastructure present to disturb birds during the earlier phases of construction. Assuming turbines are installed at a constant rate over the construction period, the proportion of the WTG array constructed increases uniformly from 0% at the start to 100% at completion. As a result, the average proportion of the WTG array present over the construction period is approximately 50%; and
- Construction activities are temporally limited (over approximately 3 years).

Few studies have provided definitive empirical displacement rates for the construction phase of OWF developments. Studies on auks show that displacement rates are either significantly lower or comparable to the operation phase (Royal HaskoningDHV 2013; Vallejo *et al.*, 2017). These studies suggest that although the level of disturbance from construction activities can be high it is focussed around a spatially restricted area within the development.

Therefore, to reflect available research and to provide a precautionary assessment during the construction phase that reflects the lower levels of displacement compared to the operational phase, displacement rates used are half those used in the operational phase assessment. This accounts for the fact that, on average over the full construction period, approximately half of the WTG array will be constructed. This approach is consistent with what has been undertaken for other projects within the UK (e.g., Natural Resources Wales (NRW) agreed that the Awel y Mor wind farm can use half operational displacement rates in the construction phase; APEM, 2022). Mortality rates used for the construction phase assessment remain the same as those used in the operational phase assessment.

For justification of displacement rates used in the assessment, reference should be made to the operational phase section (Appendix A15.5: Offshore Ornithology Displacement Analysis), with the exception of displacement rates used within the ECC assessment for common scoter, red-throated diver and great northern diver which are only considered within this section.

For the assessment of displacement impacts within the array area, the abundance of birds within the PFI plus relevant buffer was used, as justified in the species sections below. For the assessment of displacement impacts within the ECC, the assessment considers the impacts of one vessel cluster, with a surrounding 3km buffer. It is noted that a 2km buffer round vessels is standard use, but a 3km buffer is used here as a precautionary approach, accounting for the fact that vessels may be up to a kilometre apart from each other at a given point. Based on an area of disturbance of radius 3km, the area disturbed from the vessel cluster was calculated to be 28.3km², from which birds could be displaced.

Within the displacement assessment, a range of displacement rates and mortality rates are presented in each case (except Manx shearwater where only a single value is considered relevant). In each case, the full range of likely significant effects based on these parameters is presented, though a single evidence-led approach is presented to form the main basis of the assessment, representing parameters deemed most ecologically relevant based on available evidence and expert judgement. For each species, the main approach value selected is consistent with the Phase one projects and across other OWF projects in the UK.

As outlined in Table A15.11, both Project Option 1 and Project Option 2 have an equal potential for disturbance and displacement impacts, as the impact is based on the spatial area where impacts may occur (i.e., PFI which incorporates the spatial extent of both project options and the 500m LoD). This spatial area is the same for both project options, and therefore the magnitude of impact and significance of effect is the same for both project options in this section.

Common scoter

Common Scoter has been assessed for displacement in the ECC using the recent NWIS DAS data to address RFI 8aii.

Sensitivity of common scoters

Common scoter are considered to have a high vulnerability to disturbance and displacement impacts (Table A15.12). They have shown to be highly susceptible to disturbance from boat and helicopter traffic (Garthe and Huppopp, 2004), with birds showing disturbance responses at distances of over 1km from boats (Kaser *et al.*, 2006; Schwemmer *et al.*, 2011).

However, evidence on displacement impacts resulting from permanent infrastructure is more limited. Dierschke *et al.*, (2016) indicates only a weak avoidance behaviour of OWFs for this species (with most impacts resulting from boat and helicopter traffic), while post-consent monitoring at the Gwynt y Mor OWF found limited evidence of displacement impacts on this species (APEM, 2019).

During aerial surveys, no common scoters were recorded in the PFI or PFI plus 2km buffer, with raw counts of two and four individuals recorded with the PFI plus 4km buffer in November 2024 and March 2025 respectively (estimated abundances of 10 and 20). Within the ECC plus 2km buffer, a peak raw count of 791 individuals were recorded (estimated abundance of 4,249) (as presented in the Technical Baseline). They are therefore included for assessment within the ECC only. Within this data, scoter species were recorded only in the non-breeding season and therefore only this period (September to April) is considered within the assessment.

Common scoter are considered to have the same disturbance susceptibility and habitat specialisation scores as red-throated diver and great northern diver in Bradbury *et al.* (2014) and are therefore assessed using the same parameters recommended for this species within the UK Statutory Nature Conservation Body (SNCB) Guidance (MIG-Birds, 2022) which is recommended for use by both Natural England and NatureScot, presenting a range of 90% to 100% displacement and a range of 1% to 5% mortality. A displacement rate of 100% and a mortality rate of 1% are considered the most appropriate approach, with the upper displacement rate of 100% displacement selected as a precautionary approach due to the high vulnerability of this species to displacement. As discussed above, disturbance from vessels within the ECC is assessed per vessel cluster (28.3km²).

On the east coast of Ireland, there are only two SPAs where common scoter is a qualifying interest. The Raven SPA, which is located beyond the foraging range of this species, and the NWIS cSPA within which the proposed development is located and therefore to which individuals are assumed to be connected to. Common scoter are also BoCCI red listed and IUCN Least Concern. They are therefore considered to have a high conservation value (Table 15.5 of the 2024 EIAR).

Common scoter therefore have a high vulnerability (Table 15.4 of the 2024 EIAR), and a high conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as high based on the matrix approach in Table 15.6 of the 2024 EIAR.

The assessment considers displacement risk in the ECC only because common scoter are generally found within a few kilometres of the coastline and no birds were recorded in the PFI during the entire DAS programme.

Magnitude of impact (ECC)

Based on common scoter densities recorded within the NWIS DAS data, the peak density of birds present within the ECC in the non-breeding bio-season is 26.7 bird/km². Based on a total disturbance area of 28.3m² (as described above), a total of 754 (753.8) common scoters are at risk of displacement. Of these, the total displacement consequent mortality is estimated at eight (7.5) individuals, based on 100% displacement and 1% mortality.

A regional population for common scoter is not provided within Furness (2015). However, the NWIS cSPA peak non-breeding season abundance of 21,387 provides a suitably precautionary regional population size. The baseline mortality associated with this population is 4,876 individuals per annum (based on an average mortality rate of 0.228; Table A15.8).

The addition of eight individuals would represent a 0.154% increase in baseline mortality based on 100% displacement and 1% mortality. Considering the biogeographic population of 550,000 and an annual baseline mortality of 125,400 individuals per annum, the addition of eight individuals would represent a 0.006% increase in baseline mortality based on 100% displacement and 1% mortality. Potential impacts based on a displacement range of 90% to 100% and a mortality range of 1% to 5% are presented in Table 15-24 of the 2024 EIAR.

The impacts from the proposed development during the non-breeding bio-season at both the regional and biogeographic population scales represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect). This threshold is appropriate based on relevant guidance (e.g., Parker *et al.* 2022c).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (ECC)

Overall, it is predicted that the sensitivity of common scoter for both Project Option 1 and Project Option 2 is high and the magnitude of the impact is negligible. The high sensitivity and negligible magnitude of the impact on common scoter results in a not significant effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A 15.14 Predicted bio-season displacement impacts on common scoter in the ECC from the proposed development during the construction phase (replaces Table 15.24 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Bio-season mean peak density in the ECC plus 2km buffer (birds/km2) | Population size (individuals) | Estimated mortality (individuals) | | Percentage increase in baseline mortality | |
|------------------------------------|---|-------------------------------|-----------------------------------|--|---|--|
| | | | 100% displacement, 1% mortality | 90% to 100% displacement, 1% to 5% mortality | 100% displacement, 1% mortality | 90% to 100% displacement, 1% to 5% mortality |
| Non-breeding (regional population) | 26.8 | 21,387 | 7.5 | 6.8 – 37.7 | 0.154% | 0.139%–0.773% |
| Non-breeding (biogeographic) | 26.7 | 550,000 | 7.5 | 6.8 – 37.7 | 0.006% | 0.005%–0.030% |

Guillemot

The assessment of auks has been updated in line with NatureScot (2023c) guidance in response to RFI 8ci. Breeding population estimates have also been revised to use Method 2, as required under RFI 8avii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of guillemot

Guillemot are considered to have a medium vulnerability to disturbance and displacement impacts (Table A15.12). A high number of individuals were recorded during surveys, with individuals originating from a mixture of SPAs (notably Lambay Island and Ireland's Eye SPA where guillemot is a qualifying interest) and non-SPA colonies. They are also BoCCI Amber listed and IUCN Least Concern (Table 15.16 of the 2024 EIAR). They are therefore considered to have a medium conservation value (Table 15.5 of the 2024 EIAR).

Guillemot therefore have a medium vulnerability (Table 15.4 of the 2024 EIAR), and a medium conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Guillemot are assessed using a displacement rate of 25% and a mortality rate of 1%, with a displacement rate of 30% and mortality rate range 1% to 5% also presented as per NatureScot guidance. Displacement rates used represent half the rates used in the operational phase, with a full justification of rates used provided in that section (Appendix A15.5: Offshore Ornithology Displacement Analysis).

As outlined in Table A15.6, two bio-season approaches are considered for guillemot, with a more ecologically relevant site-specific approach forming the main basis of the assessment, and results based on the general Furness approach used for other species also presented.

Whilst present in significant numbers within the ECC +2km buffer based on the NWIS DAS, the assessment considers displacement risk in the PFI only because auks are not particularly sensitive to vessel disturbance (Jarrett *et al.*, 2018), which is the main form of disturbance within the ECC.

As explained in Section 15.3.2, no model-based abundance estimates were used within this assessment, all abundance estimates are therefore design-based.

Magnitude of impact (PFI)

The abundance of guillemot within the PFI plus 2km buffer and across the NWIS cSPA support the shortened breeding bio-season for guillemot. During 2020, 2022 and 2025 the core breeding season when birds are constrained clearly falls within the months of May and June (Appendix A15.1: Offshore and Intertidal Ornithology Technical Baseline: Section 2.12 Guillemot bio-seasons; Appendix A15.2: MRSea Modelling for Offshore Ornithology). By July birds had dispersed more widely across the NWIS cSPA and beyond. In July 2021, the distribution of guillemot is more constrained compared to the other July surveys, potentially showing a later dispersal of birds from colonies during this year.

During the breeding season, the mean peak abundance for guillemot based on the proposed site-specific approach to bio-seasons is 988 individuals within the PFI plus 2km buffer. Based on 25% displacement and 1% mortality, the estimated displacement consequent mortality is three (2.5) individuals per annum.

Assuming a breeding bio-season regional population size of 190,073 individuals (Table A15.7) and a baseline mortality of 26,800 individuals per annum (derived from an average mortality rate of 0.141; Table A15.8), the addition of three displacement consequent mortalities would represent a 0.009% increase in baseline mortality. Potential impacts based on 30% displacement and 3% and 5% mortality and based on the Furness approach to bio-seasons are presented in Table A15.15 below.

During the non-breeding bio-season, the mean peak abundance for guillemot is 21,074 individuals within the PFI plus 2km buffer. Based on 25% displacement and 1% mortality, the estimated displacement consequent mortality is 53 (52.7) individuals per annum.

Assuming a non-breeding bio-season regional population size of 1,332,623 individuals (Table A15.7) and a baseline mortality of 187,900 individuals per annum (derived from an average mortality rate of 0.141; Table A15.8), the addition of 53 displacement consequent mortalities would represent a 0.028% increase in baseline mortality. Potential impacts based on a 30% displacement and 1% and 3% mortality and based on the Furness approach to bio-seasons, are presented in Table A15.15 below.

Across all bio-seasons, the total mean peak abundance of guillemot in the PFI plus 2km buffer is 22,061. Based on 25% displacement and 1% mortality, the estimated displacement consequent mortality is 55 (55.2) individuals per annum.

Assuming the largest regional population size of 1,332,623 individuals (Table A15.7) and a baseline mortality of 187,900 individuals per annum (derived from an average mortality rate of 0.141; Table A15.8), the addition of 55 displacement consequent mortalities would represent a 0.084% increase in baseline mortality. Considering the biogeographic population size of 4,125,000, with a baseline mortality of 581,625 individuals per annum, the addition of 55 displacement consequent mortalities would represent a 0.010% increase in baseline mortality. Potential impacts based on NatureScot rates, and on the Furness approach to bio-seasons are presented in Table A15.15 below.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of guillemot for Project Option 1 and Project Option 2 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on guillemot results in an imperceptible effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.15 Predicted bio-season displacement impacts on guillemot from the proposed development during the construction phase (replaces Table 15.25 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Bio-season mean peak abundance in the PFI plus 2km buffer Estimated mortality (+/- 95% CI) | Population size (individuals) | Estimated mortality (+/- 95% CI) | | | Percentage increase in baseline mortality (+/- 95% CI) | | |
|--|--|-------------------------------|----------------------------------|---------------------------------------|---------------------------------------|--|---------------------------------------|---------------------------------------|
| | | | 25% displacement, 1% mortality | 30% displacement, 1% and 3% mortality | 30% displacement, 3% and 5% mortality | 25% displacement, 1% mortality | 30% displacement, 1% and 3% mortality | 30% displacement, 3% and 5% mortality |
| Furness approach to bio-seasons | | | | | | | | |
| Breeding | 16,318.3 (8,345.3-25,924.3) | 190,073 | 40.8 (20.9-64.8) | 146.9 (75.1-233.3) | 244.8 (125.2-388.9) | 0.153% (0.078%-0.243%) | 0.550% (0.281%-0.874%) | 0.917% (0.469%-1.456%) |
| Non-breeding | 18,766.2 (11,201.0-26,523.4) | 1,332,623 | 46.9 (28.0-66.3) | 56.3 (33.6-79.6) | 168.9 (100.8-238.7) | 0.025% (0.015%-0.035%) | 0.030% (0.018%-0.043%) | 0.090% (0.054%-0.127%) |
| Annual (regional population) | 35,084.5 (19,546.3-52,447.7) | 1,332,623 | 87.7 (48.9-131.1) | 203.2 (108.7-312.9) | 413.7 (226.0-627.6) | 0.047% (0.026%-0.070%) | 0.109% (0.058%-0.167%) | 0.221% (0.121%-0.335%) |
| Annual (biogeographic) | 35,084.5 (19,546.3-52,447.7) | 4,125,000 | 87.7 (48.9-131.1) | 203.2 (108.7-312.9) | 413.7 (226.0-627.6) | 0.015% (0.008%-0.023%) | 0.035% (0.019%-0.054%) | 0.071% (0.039%-0.108%) |
| Site-specific approach to bio-seasons | | | | | | | | |
| Breeding | 987.5 (715.8-1,278.5) | 190,073 | 2.5 (1.8-3.2) | 8.9 (6.4-11.5) | 14.8 (10.7-19.2) | 0.009% (0.007%-0.012%) | 0.033% (0.024%-0.043%) | 0.055% (0.040%-0.072%) |
| Non-breeding | 21,073.8 (12,387.6-31,292.6) | 1,332,623 | 52.7 (31.0-78.2) | 63.2 (37.2-93.9) | 189.7 (111.5-281.6) | 0.028% (0.017%-0.042%) | 0.034% (0.020%-0.050%) | 0.101% (0.060%-0.150%) |
| Annual (regional population) | 22,061.3 (13,103.4-32,571.1) | 1,332,623 | 55.2 (32.8-81.4) | 144.2 (87.2-210.8) | 204.5 (122.2-300.8) | 0.029% (0.018%-0.043%) | 0.077% (0.047%-0.113%) | 0.109% (0.065%-0.161%) |
| Annual (biogeographic) | 22,061.3 (13,103.4-32,571.1) | 4,125,000 | 55.2 (32.8-81.4) | 144.2 (87.2-210.8) | 204.5 (122.2-300.8) | 0.010% (0.006%-0.014%) | 0.025% (0.015%-0.036%) | 0.035% (0.021%-0.052%) |

Razorbill

The assessment of auks has been updated in line with NatureScot guidance (2023c) in response to RFI 8ci. Breeding population estimates have also been revised to use Method 2, as required under RFI 8avii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of razorbill

Razorbill are considered to have a medium vulnerability to disturbance and displacement impacts (Table A15.12). A high number of individuals were recorded during DAS surveys, with individuals originating from a mixture of SPAs (notably Lambay Island and Ireland's Eye SPA where razorbill is a qualifying interest) and non-SPA colonies. They are also BoCCI Amber listed and IUCN Least Concern (Table 15.16 of the 2024 EIAR). They are therefore considered to have a medium conservation value (Table 15.5 of the 2024 EIAR).

Razorbill therefore have a medium vulnerability (Table 15.4 of the 2024 EIAR), and a medium conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Razorbill are assessed using a displacement rate of 25% and a mortality rate of 1%, with a displacement rate of 30% displacement and a mortality rate range of 1% to 5% also presented in line with NatureScot guidance. Displacement rates used represent half the rates used in the operational phase, with a full justification of rates used provided in discussion of the operational phase (Appendix A15.5: Offshore Ornithology Displacement Analysis).

As outlined in Table A15.6, two bio-season approaches are considered for razorbill, with a more ecologically relevant site-specific approach forming the main basis of the assessment, and results based on the general Furness approach used for other species also presented.

The assessment considers displacement risk in the PFI only, with a low number of birds recorded in the ECC (noting the ECC data does not distinguish between guillemot and razorbill).

Magnitude of impact (PFI)

During the breeding season, the mean peak abundance for razorbill is 175 individuals within the PFI plus 2km buffer. Based on 25% displacement and 1% mortality, the estimated displacement consequent mortality is less than one (0.4) individuals per annum.

Assuming a breeding bio-season regional population size of 49,298 individuals (Table A15.7) and a baseline mortality of 6,419 individuals per annum (derived from an average mortality rate of 0.130; Table A15.8), the addition of less than one displacement consequent mortality would represent a 0.006% increase in baseline mortality. Potential impacts based on NatureScot rates of 35% displacement and 3% and 5% mortality and based on the Furness approach to bio-seasons, are presented in Table A15.16 below.

During the autumn migration bio-season, the mean peak abundance for razorbill is 4,896 individuals within the PFI plus 2km buffer. Based on 25% displacement and 1% mortality, the estimated displacement consequent mortality is 12 (12.2) individuals per annum.

Assuming an autumn migration bio-season regional population size of 632,453 individuals (Table A15.7) and a baseline mortality of 82,345 individuals per annum (derived from an average mortality rate of 0.130; Table A15.8), the addition of 12 displacement consequent mortalities would represent a 0.015% increase in baseline mortality. Potential impacts based on NatureScot rates of 35% displacement and 1% and 3% mortality and based on the Furness approach to bio-seasons, are presented in Table A15.16 below.

During the spring migration bio-season, the mean peak abundance for razorbill is 915 individuals within the PFI plus 2km buffer. Based on 25% displacement and 1% mortality, the estimated displacement consequent mortality is two (2.3) individual per annum.

Assuming a spring migration bio-season regional population size of 632,453 individuals (Table A15.7) and a baseline mortality of 82,345 individuals per annum (derived from an average mortality rate of 0.130; Table A15.8), the addition of two displacement consequent mortality would represent a 0.003% increase in baseline mortality. Potential impacts based on NatureScot rates of 35% displacement and 1% and 3% mortality and based on the Furness approach to bio-seasons, are presented in Table A15.16 below.

During the migration-free winter bio-season, the mean peak abundance for razorbill is 1,225 individuals within the PFI plus 2km buffer. Based on 25% displacement and 1% mortality, the estimated displacement consequent mortality is three (3.1) individuals per annum.

Assuming a migration-free winter bio-season regional population size of 366,961 individuals (Table A15.7) and a baseline mortality of 47,778 individuals per annum (derived from an average mortality rate of 0.130; Table A15.8), the addition of three displacement consequent mortalities would represent a 0.006% increase in baseline mortality. Potential impacts based on NatureScot rates of 35% displacement and 1% and 3% mortality and based on the Furness approach to bio-seasons, are presented in Table A15.16 below.

Across all bio-seasons, the total mean peak abundance of razorbill in the PFI plus 2km buffer is 7,212. Based on 25% displacement and 1% mortality, the estimated displacement consequent mortality is 18 (18.0) individuals per annum.

Assuming the largest regional population size of 632,453 individuals (Table A15.7) and a baseline mortality of 82,345 individuals per annum (derived from an average mortality rate of 0.130; Table A15.8), the addition of 18 displacement consequent mortalities would represent a 0.022% increase in baseline mortality. Considering the biogeographic population size of 1,707,000, with a baseline mortality of 222,251 individuals per annum, the addition of 18 displacement consequent mortalities would represent a 0.008% increase in baseline mortality. Potential impacts based on Guidance Approach to mortality and based on the Furness approach to bio-seasons, are presented in Table A15.16 below.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of razorbill for Project Option 1 and Project Option 2 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on razorbill results in an imperceptible effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.16 Predicted bio-season displacement impacts on razorbill from the proposed development during the construction phase (replaces Table 15.26 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Bio-season mean peak abundance in the PFI plus 2km buffer (+/- 95% CI) | Population size (individuals) | Estimated mortality (individuals) (+/- 95% CI) | | | Percentage increase in baseline mortality (+/- 95% CI) | | |
|--|--|-------------------------------|--|---------------------------------------|---------------------------------------|--|---------------------------------------|---------------------------------------|
| | | | 25% displacement, 1% mortality | 30% displacement, 1% and 3% mortality | 30% displacement, 3% and 5% mortality | 25% displacement, 1% mortality | 30% displacement, 1% and 3% mortality | 30% displacement, 3% and 5% mortality |
| Furness approach to bio-seasons | | | | | | | | |
| Autumn migration | 4,895.8 (1,994.6-8,086.6) | 632,453 | 12.2 (5.0-20.2) | 14.7 (6.0-24.3) | 44.1 (18.0-72.8) | 0.015% (0.006%-0.025%) | 0.018% (0.007%-0.030%) | 0.054% (0.022%-0.088%) |
| Breeding | 1,109.5 (417.5-1,777.8) | 49,298 | 2.8 (1.0-4.4) | 10.0 (3.8-16.0) | 16.6 (6.3-26.7) | 0.044% (0.016%-0.069%) | 0.156% (0.059%-0.249%) | 0.259% (0.098%-0.416%) |
| Migration-free winter | 1,225.3 (469.7-2,009.7) | 366,961 | 3.1 (1.2-5.0) | 3.7 (1.4-6.0) | 11.0 (4.2-18.1) | 0.006% (0.003%-0.010%) | 0.008% (0.003%-0.013%) | 0.023% (0.009%-0.038%) |
| Spring migration | 915.3 (669.0-1,180.0) | 632,453 | 2.3 (1.7-3.0) | 2.7 (2.0-3.5) | 8.2 (6.0-10.6) | 0.003% (0.002%-0.004%) | 0.003% (0.002%-0.004%) | 0.010% (0.007%-0.013%) |
| Annual (regional population) | 8,146.0 (3,550.8-13,054.0) | 632,453 | 20.4 (8.9-32.6) | 31.1 (13.2-49.8) | 80.0 (34.5-128.2) | 0.025% (0.011%-0.040%) | 0.038% (0.016%-0.060%) | 0.097% (0.042%-0.156%) |
| Annual (biogeographic) | 8,146.0 (3,550.8-13,054.0) | 1,707,000 | 20.4 (8.9-32.6) | 31.1 (13.2-49.8) | 80.0 (34.5-128.2) | 0.009% (0.004%-0.015%) | 0.014% (0.006%-0.022%) | 0.036% (0.016%-0.058%) |
| Site-specific approach to bio-seasons | | | | | | | | |
| Autumn migration | 4,895.8 (1,994.6-8,086.6) | 632,453 | 12.2 (5.0-20.2) | 14.7 (6.0-24.3) | 44.1 (18.0-72.8) | 0.015% (0.006%-0.025%) | 0.018% (0.007%-0.030%) | 0.054% (0.022%-0.088%) |
| Breeding | 175.0 (95.0-257.5) | 49,298 | 0.4 (0.2-0.6) | 1.6 (0.9-2.3) | 2.6 (1.4-3.9) | 0.006% (0.003%-0.009%) | 0.025% (0.014%-0.036%) | 0.041% (0.022%-0.061%) |
| Migration-free winter | 1,225.3 (469.7-2,009.7) | 366,961 | 3.1 (1.2-5.0) | 3.7 (1.4-6.0) | 11.0 (4.2-18.1) | 0.006% (0.003%-0.010%) | 0.008% (0.003%-0.013%) | 0.023% (0.009%-0.038%) |
| Spring migration | 915.3 (669.0-1,180.0) | 632,453 | 2.3 (1.7-3.0) | 2.7 (2.0-3.5) | 8.2 (6.0-10.6) | 0.003% (0.002%-0.004%) | 0.003% (0.002%-0.004%) | 0.010% (0.007%-0.013%) |
| Annual (regional population) | 7,211.5 (3,228.3-11,533.8) | 632,453 | 18.0 (8.1-28.8) | 22.7 (10.3-36.1) | 66.0 (29.6-105.3) | 0.022% (0.010%-0.035%) | 0.028% (0.013%-0.044%) | 0.080% (0.036%-0.128%) |
| Annual (biogeographic) | 7,211.5 (3,228.3-11,533.8) | 1,707,000 | 18.0 (8.1-28.8) | 22.7 (10.3-36.1) | 66.0 (29.6-105.3) | 0.008% (0.004%-0.013%) | 0.010% (0.005%-0.016%) | 0.030% (0.013%-0.047%) |

Puffin

The assessment of auks has been updated in line with NatureScot guidance (2023c) in response to RFI 8ci. Breeding population estimates have also been revised to use Method 2, as required under RFI 8aviii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of puffin

Puffin are considered to have a low to medium vulnerability to disturbance and displacement impacts (Table A15.12). During surveys, a low number of individuals were recorded. Recorded individuals are assumed to originate from a number of designated and non-designated sites, including Lambay Island SPA where puffin is a qualifying interest. Puffin are also BoCCI Amber listed and IUCN Vulnerable (Table 15.16 of the 2024 EIAR). They are therefore considered to have a medium conservation value (Table 15.5 of the 2024 EIAR).

Puffin therefore have a medium vulnerability (Table 15.4 of the 2024 EIAR), and a medium conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Puffin are assessed using a displacement rate of 25% and a mortality rate of 1%, with a displacement rate of 30% displacement and a mortality rate range of 1% to 5% also presented. Displacement rates used represent half the rates used in the operational phase (Appendix A15.3: Offshore Ornithology Collision Risk Modelling Assessment), with a full justification of rates used provided in this section.

This assessment considers displacement risk in the PFI plus 2km buffer. No birds were recorded in the ECC based on observations by Jessop *et al.*, (2018).

Magnitude of impact (PFI)

During the breeding season, the mean peak abundance for puffin is 17 individuals within the PFI plus 2km buffer. Based on 25% displacement and 1% mortality, the estimated displacement consequent mortality is less than one (<0.1) individuals per annum.

Assuming a breeding bio-season regional population size of 79,939 individuals (Table A15.7) and a baseline mortality of 9,513 individuals per annum (derived from an average mortality rate of 0.119; Table A15.8), the addition of less than one displacement consequent mortality would represent a <0.001% increase in baseline mortality. Potential impacts based on 30% displacement and 3% and 5% mortality are presented in Table A15.17 below.

During the non-breeding season, the mean peak abundance for puffin is 14 individuals within the PFI plus 2km buffer. Based on 25% displacement and 1% mortality, the estimated displacement consequent mortality is less than one (<0.1) individuals per annum.

Assuming a non-breeding bio-season regional population size of 300,427 individuals (Table A15.7) and a baseline mortality of 35,751 individuals per annum (derived from an average mortality rate of 0.119; Table A15.8), the addition of less than one displacement consequent mortalities would represent a <0.001% increase in baseline mortality. Potential impacts based on 30% displacement and 1% and 3% mortality are presented in Table A15.17 below.

Across all bio-seasons, the total mean peak abundance of puffin in the PFI plus 2km buffer is 32. Based on 25% displacement and 1% mortality, the estimated displacement consequent mortality is less than one (0.1) individual per annum.

Assuming the largest regional population size of 300,427 individuals (Table A15.7) and a baseline mortality of 35,751 individuals per annum (derived from an average mortality rate of 0.119; Table A15.8), the addition of less than one displacement consequent mortality would represent a <0.001% increase in baseline mortality. Considering the biogeographic population size of 11,840,000, with a baseline mortality of 1,408,960 individuals per annum, the addition of less than one displacement consequent mortalities would represent a <0.001% increase in baseline mortality. Potential impacts based on Guidance Approach to mortality are presented in Table A15.17 below.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of puffin for Project Option 1 and Project Option 2 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on puffin results in an imperceptible effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.17 Predicted bio-season displacement impacts on puffin from the proposed development during the construction phase (replaces Table 15.27 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Bio-season mean peak abundance in the PFI plus 2km buffer (+/- 95% CI) | Population size (individuals) | Estimated mortality (+/- 95% CI) | | | Percentage increase in baseline mortality (+/- 95% CI) | | |
|------------------------------|--|-------------------------------|----------------------------------|---------------------------------------|--------------------------------------|--|---------------------------------------|--------------------------------------|
| | | | 25% displacement, 1% mortality | 30% displacement, 1% and 3% mortality | 30% displacement, 3% to 5% mortality | 25% displacement, 1% mortality | 30% displacement, 1% and 3% mortality | 30% displacement, 3% to 5% mortality |
| Breeding | 17.3 (7.0-30.8) | 79,939 | 0.0 (0.0-0.1) | 0.2 (0.1-0.3) | 0.3 (0.1-0.5) | 0.000% (0.000%-0.001%) | 0.002% (0.001%-0.003%) | 0.003% (0.001%-0.005%) |
| Non-breeding | 14.2 (2.8-40.2) | 300,427 | 0.0 (0.0-0.1) | 0.0 (0.0-0.1) | 0.1 (0.0-0.4) | 0.000% (0.000%-0.000%) | 0.000% (0.000%-0.000%) | 0.000% (0.000%-0.001%) |
| Annual (regional population) | 31.5 (9.8-71.0) | 300,427 | 0.1 (0.0-0.2) | 0.2 (0.1-0.4) | 0.4 (0.1-0.8) | 0.000% (0.000%-0.001%) | 0.001% (0.000%-0.001%) | 0.001% (0.000%-0.002%) |
| Annual (biogeographic) | 31.5 (9.8-71.0) | 11,840,000 | 0.1 (0.0-0.2) | 0.2 (0.1-0.4) | 0.4 (0.1-0.8) | 0.000% (0.000%-0.000%) | 0.000% (0.000%-0.000%) | 0.000% (0.000%-0.000%) |

Red-throated diver

The red-throated diver assessment has been updated to include displacement effects from the PFI out to 10km, in response to RFI 8ciii. The assessment now relies solely on the NWIS DAS dataset, as it provides the most recent, highest-resolution, and widest spatial-coverage data available, making it the most appropriate dataset for assessing both the ECC +2km buffer and the PFI + 10 km buffer.

Sensitivity of red-throated diver

Red-throated diver are considered to have a high vulnerability to disturbance and displacement impacts (Table A15.12). Red-throated diver commonly avoid areas associated with shipping (e.g. Bellebaum *et al.*, 2006; Irwin *et al.*, 2019; Jarrett *et al.*, 2018; Schwemmer *et al.*, 2011), with birds recorded flushing due to the presence of ships up to 2km from the vessels, though the majority are expected to flush at 1km or less (Bellebaum *et al.*, 2006; Jarrett *et al.*, 2018; Topping and Petersen, 2011).

During site-specific aerial surveys only two red-throated diver were recorded within the PFI (one individual in November 2024 and one individual in December 2024), with an estimated peak abundance of 170 in the PFI 10km buffer. In the ECC, aerial survey data estimated a peak abundance of 375 birds. Therefore red-throated diver are included for assessment with the array and the ECC due to their sensitivity to disturbance and displacement.

To reflect their high vulnerability to vessel displacement, a displacement rate of 100% is proposed for the ECC assessment. A range of displacement from 90% to 100% is also presented as recommended by MIG-Birds (2022). A mortality rate of 1% is also deemed most realistic for the assessment, with a range of 1% to 5% also presented. For the PFI, red-throated diver are assessed using a displacement rate of 50% and a mortality rate of 1% within the PFI and a displacement rate of 26% and a mortality rate of 1% within the 4 to 10km buffer. Displacement rates used represent half the rates used in the operational phase, with a full justification of rates used provided in that section (Appendix A15.3: Offshore Ornithology Collision Risk Modelling Assessment).

The NWIS cSPA is the only SPA designated for red-throated diver with connectivity to the proposed development. Red-throated diver are also BoCCI Amber listed, IUCN Least Concern and Birds Directive Annex 1 (Table 15.16 of the 2024 EIAR). Overall conservation value could therefore be considered as either medium or high based on these criteria (i.e., high connectivity to an SPA, though relatively low conservation status), though as a precautionary approach, conservation value is considered as high (Table 15.5 of the 2024 EIAR).

Red-throated diver therefore have a high vulnerability (Table 15.4 of the 2024 EIAR), and a high conservation value, with overall receptor sensitivity assessed as high based on the matrix approach in Table 15.6 of the 2024 EIAR.

Magnitude of impact (PFI)

In the spring migration bio-season, no birds were recorded within the PFI plus 4km buffer, with a peak abundance of 117 in the 4 to 10km buffer. Of these, the total displacement consequent mortality is estimated at less than one (0.3) individual, based on 50% displacement and 1% mortality in the PFI plus 4km buffer, and 26% displacement and 1% mortality in the 4km to 10km buffer.

Assuming a spring migration regional population size of 12,717 individuals, with an annual baseline mortality of 2,850 individuals per annum (derived from an average mortality rate of 0.224; Table A15.7). The addition of less than one individual would represent a 0.011% increase in baseline mortality based on 50% displacement and 1% mortality in the PFI plus 4km buffer, and 26% displacement and 1% mortality in the 4km to 10km buffer. Potential impacts based on a displacement range of 45% to 50% in the array, 26% mortality in the 4km to 10km buffer, and a mortality range of 1% to 5% are presented in Table A15.18.

In the autumn migration bio-season, a peak abundance of 7 birds were estimated within the PFI plus 4km buffer, with a peak abundance of 163 in the 4 to 10km buffer. Of these, the total displacement consequent mortality is estimated at less than one (0.5) individual, based on 50% displacement and 1% mortality in the PFI plus 4km buffer, and 26% displacement and 1% mortality in the 4km to 10km buffer.

Assuming an autumn migration regional population size of 12,717 individuals, with an annual baseline mortality of 2,850 individuals per annum (derived from an average mortality rate of 0.224; Table A15.7). The addition of less than one individual would represent a 0.016% increase in baseline mortality based on 50% displacement and 1% mortality in the PFI plus 4km buffer, and 26% displacement and 1% mortality in the 4km to 10km buffer. Potential impacts based on a displacement range of 45% to 50% in the array, 26% mortality in the 4km to 10km buffer, and a mortality range of 1% to 5% are presented in Table A15.18.

In the migration-free winter bio-season, a peak abundance of 14 birds were estimated within the PFI plus 4km buffer, with a peak abundance of 85 in the 4 to 10km buffer. Of these, the total displacement consequent mortality is estimated at less than one (0.3) individual, based on 50% displacement and 1% mortality in the PFI plus 4km buffer and 26% displacement and 1% mortality in the 4km to 10km buffer.

Assuming a migration-free winter regional population size of 4,148 individuals, with an annual baseline mortality of 929 individuals per annum (derived from an average mortality rate of 0.224; Table A15.7). The addition of less than one individual would represent a 0.032% increase in baseline mortality based on 50% displacement in the PFI plus 4km buffer and 1% mortality and 26% displacement and 1% mortality in the 4km to 10km buffer. Potential impacts based on a displacement range of 45% to 50% in the array, 26% mortality in the 4km to 10km buffer, and a mortality range of 1% to 5% are presented in Table A15.18.

Across all non-breeding bio-seasons combined the total estimated number of red-throated diver at risk of displacement is 21 in the PFI plus 4km buffer, and 365 in the 4km to 10km buffer. Of these, the total displacement consequent mortality is estimated at one (1.1) individual, based on 50% displacement and 1% mortality in the PFI plus 4km buffer and 26% displacement and 1% mortality in the 4km to 10km buffer.

Considering the largest regional population of 12,717 individuals, and an annual baseline mortality of 2,850 individuals per annum, the addition of two individuals would represent a 0.037% increase in baseline mortality. Based on the biogeographic population of 27,000 individuals, and a baseline mortality of 6,050 individuals per annum, the addition of two individuals would represent a 0.017% increase in baseline mortality. Potential impacts based on a displacement range of 45% to 50% in the array, 26% mortality in the 4km to 10km buffer, and a mortality range of 1% to 105 are presented in Table A15.18.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of red-throated diver for Project Option 1 and Project Option 2 is high and the magnitude of the impact is negligible. The high sensitivity and negligible magnitude of the impact on red-throated diver results in a not significant effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.18 Predicted bio-season displacement impacts on red-throated diver from the proposed development during the construction phase (replaces Table 15.28 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Bio-season mean peak abundance (PFI plus relevant buffer) | Population size (individuals) | Estimated mortality (individuals) | | Percentage increase in baseline mortality | |
|------------------------------|---|-------------------------------|---|---|--|---|
| | | | 50% displacement, 1% mortality (PFI + 4km buffer) 26% displacement, 1% mortality (4-10km buffer) | 45% to 50% displacement, 1% to 10% mortality (PFI + 4km buffer) 26% displacement, 1% mortality (4-10km buffer) | 50% displacement, 1% mortality (PFI+ 4km buffer) 26% displacement, 1% mortality (4-10km buffer) | 45% to 50% displacement, 1% to 10% mortality (PFI + 4km buffer) 26% displacement, 1% mortality (4-10km buffer) |
| Spring migration | 0 (PFI + 4km) 117 (4km – 10km) | 12,717 | 0.31 | 0.31 | 0.011 | 0.011 |
| Autumn migration | 7 (PFI + 4km) 163 (4km – 10km) | 12,717 | 0.46 | 0.46 - 0.77 | 0.016 | 0.016 – 0.027 |
| Migration-free winter | 14 (PFI + 4km) 85 (4km – 10km) | 4,148 | 0.29 | 0.28 – 0.92 | 0.032 | 0.031 – 0.099 |
| Annual (regional population) | 21 (PFI + 4km) 365 (4km – 10km) | 12,717 | 1.05 | 1.04 – 2.00 | 0.037 | 0.037 – 0.070 |
| Annual (biogeographic) | 21 (PFI + 4km) 365 (4km – 10km) | 27,000 | 1.05 | 1.04 – 2.00 | 0.017 | 0.017 – 0.033 |

Magnitude of impact (ECC)

Data collected by the Developer covering the NWIS DAS was used in favour of the Jessop *et al.*, (2018) dataset as it provides the most recent, highest-resolution, and widest spatial-coverage data available.

Based on red-throated diver densities recorded within the NWIS DAS data, the peak density of birds presents within the ECC +2km buffer in the autumn migration bio-season, is 2.4 birds/km². Based on a total disturbance area of 28.3km², a total of 68 (67.9) red-throated diver are at risk of displacement. Of these, the total displacement consequent mortality is estimated at one (0.7) individual, based on 100% displacement and 1% mortality.

Assuming an autumn migration regional population size of 12,717 individuals, with an annual baseline mortality of 2,850 individuals per annum (derived from an average mortality rate of 0.224; Table A15.7). The addition of one individual would represent a 0.024% increase in baseline mortality based on 100% displacement and 1% mortality. Potential impacts based on a displacement range of 90% to 100% and a mortality range of 1% to 5% are presented in Table A15.19.

In the spring migration bio-season, the density of birds present within the ECC is 1.0 birds/km². Based on a total disturbance area of 28.3km², a total of 28 (28.3) red-throated diver are at risk of displacement. Of these, the total displacement consequent mortality is estimated at less than one (0.3) individual, based on 100% displacement and 1% mortality.

Assuming an spring migration regional population size of 12,717 individuals, with an annual baseline mortality of 2,850 individuals per annum (derived from an average mortality rate of 0.224; Table A15.7). The addition of less than one individual would represent a 0.010% increase in baseline mortality based on 100% displacement and 1% mortality. Potential impacts based on a displacement range of 90% to 100% and a mortality range of 1% to 5% are presented in Table A15.19.

In the migration-free winter bio-season, the density of birds present within the ECC is 1.6 birds/km². Based on a total disturbance area of 28.3km², a total of 45 (44.7) red-throated diver are at risk of displacement. Of these, the total displacement consequent mortality is estimated at less than one (0.5) individual, based on 100% displacement and 1% mortality.

Assuming a migration-free winter regional population size of 4,148 individuals, with an annual baseline mortality of 929 individuals per annum (derived from an average mortality rate of 0.224; Table A15.7). The addition of less than one individual would represent a 0.048% increase in baseline mortality based on 100% displacement and 1% mortality. Potential impacts based on a displacement range of 90% to 100% and a mortality range of 1% to 5% are presented in Table A15.19.

Across all non-breeding bio-seasons combined the total displacement consequent mortality is estimated at one (1.4) individual, based on 100% displacement and 1% mortality.

Considering the largest regional population of 12,717 individuals, and an annual baseline mortality of 2,850 individuals per annum, the addition of one individual would represent a 0.049% increase in baseline mortality. Based on the biogeographic population of 27,000 individuals, and a baseline mortality of 6,050 individuals per annum, the addition of one individual would represent a 0.023% increase in baseline mortality. Potential impacts based on a displacement range of 90% to 100% and a mortality range of 1% to 5% are presented in Table A15.19.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (ECC)

Overall, it is predicted that the sensitivity of red-throated diver for Project Option 1 and Project Option 2 is high and the magnitude of the impact is negligible. The high sensitivity and negligible magnitude of the impact on red-throated diver results in a not significant effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.19 Predicted bio-season displacement impacts on red-throated diver in the ECC from the proposed development during the construction phase (replaces Table 15.28 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Bio-season mean peak density in the ECC plus 2km buffer (birds/km ²) | Population size (individuals) | Estimated mortality (individuals) | | Percentage increase in baseline mortality | |
|------------------------------|--|-------------------------------|-----------------------------------|--|---|--|
| | | | 100% displacement, 1% mortality | 90% to 100% displacement, 1% to 5% mortality | 100% displacement, 1% mortality | 90% to 100% displacement, 1% to 5% mortality |
| Spring migration | 1.0 | 12,717 | 0.3 | 0.3 – 1.4 | 0.010 | 0.009 – 0.049 |
| Autumn migration | 2.4 | 12,717 | 0.7 | 0.6 – 3.3 | 0.024 | 0.021 – 0.117 |
| Migration-free winter | 1.6 | 4,148 | 0.5 | 0.4 – 2.2 | 0.048 | 0.043 – 0.240 |
| Annual (regional population) | - | 12,717 | 1.4 | 1.3 – 7.0 | 0.049 | 0.044 – 0.244 |
| Annual (biogeographic) | - | 27,000 | 1.4 | 1.3 – 7.0 | 0.023 | 0.021 – 0.115 |

Great northern diver

The red-throated diver assessment has been updated to include displacement effects from the PFI out to 4km, in response to RFI 8ciii. The assessment now relies solely on the NWIS DAS dataset, as it provides the most recent, highest-resolution, and widest spatial-coverage data available, making it the most appropriate dataset for assessing both the ECC +2km buffer and the PFI + 4km buffer.

Sensitivity of great northern diver

In comparison to red-throated diver, evidence on the sensitivity of great northern diver is sparse. Some evidence (e.g. Bradbury *et al.* 2014) indicates that great northern diver are highly vulnerable to disturbance and displacement, while research in Ireland has shown that great northern diver do not show a flush response to boat traffic, even when birds are within 20m of some birds (Gittings *et al.*, 2015). As a precautionary approach, it is assumed the sensitivity of great northern diver is high (Table A15.12).

The NWIS cSPA is the only SPA designated for great northern diver with connectivity to the proposed development. Great northern diver are also BoCCI Green listed and Birds Directive Annex 1 (Table 15.16 of the 2024 EIAR). They are therefore considered to have a medium conservation value (Table 15.5 of the 2024 EIAR).

To reflect their high vulnerability to displacement, a displacement rate of 100% is proposed for the ECC assessment, with a range of 90% to 100% also presented. For mortality, a rate of 1% is deemed most realistic for the assessment, with a range of 1% to 5% also presented.

Great northern diver therefore has a high vulnerability (Table 15.4 of the 2024 EIAR), and a medium conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as high based on the matrix approach in Table 15.6 of the 2024 EIAR).

This assessment considers displacement risk in the ECC +2km buffer only, with just one bird recorded in the PFI and 4km buffer.

Magnitude of impact (ECC)

For great northern diver, only one bio-season is considered relevant (the non-breeding bio-season; Table 15.14 of the 2024 EIAR). Therefore, this assessment considers the peak density of the autumn and winter surveys to represent the full non-breeding season (September – May) density.

Based on data on great northern diver densities recorded within the NWIS DAS data, the peak density of birds present within the ECC plus a 2km buffer in the non-breeding bio-season is 0.4 bird/km². Based on a total disturbance area of 28.3km², a total of ten (9.9) great northern diver are at risk of displacement. Of these, the total displacement consequent mortality is estimated at almost zero (0.1) individuals, based on 100% displacement and 1% mortality.

Based on a non-breeding regional population size of 871 individuals, with an annual baseline mortality of 140 individuals per annum (based on an average mortality rate of 0.161; Table A15.8). The addition of almost zero individuals would represent a 0.071% increase in baseline mortality based on 100% displacement and 1% mortality. Considering a biogeographic population of 430,000 individuals and a baseline mortality of 69,179 individuals per annum, the addition of almost zero individuals would represent a <0.001% increase in baseline mortality. Potential impacts based on a displacement range of 90% to 100% and a mortality range of 1% to 5% are presented in Table A15.20.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (ECC)

Overall, it is predicted that the sensitivity of great northern diver for Project Option 1 and Project Option 2 is high and the magnitude of the impact is negligible. The high sensitivity and negligible magnitude of the impact on great northern diver results in a not significant effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.20 Predicted bio-season displacement impacts on great northern diver in the ECC plus 2km buffer from the proposed development during the construction phase (replaces Table 15.29 of Chapter 15 in the 2024 EIAR).

| Bio-season (months) | Bio-season mean peak density in the ECC plus 2km buffer (birds/km2) | Population size (individuals) | Estimated mortality (individuals) | | Percentage increase in baseline mortality | |
|------------------------------------|---|-------------------------------|-----------------------------------|--|---|--|
| | | | 100% displacement, 1% mortality | 90% to 100% displacement, 1% to 5% mortality | 100% displacement, 1% mortality | 90% to 100% displacement, 1% to 5% mortality |
| Non-breeding (regional population) | 9.9 | 871 | 0.1 | 0.1–0.5 | 0.071% | 0.064%–0.353% |
| Non-breeding (biogeographic) | 9.9 | 430,000 | 0.1 | 0.1–0.5 | <0.001% | <0.001%–0.001% |

Manx shearwater

Breeding population estimates have been revised to use Method 2 for all other species, as required under RFI 8avii. However, for Manx shearwater, the Method 2 population estimate is not most precautionary approach considering this population is greater than Method 1. As a result, Method 1 population estimate has been used for Manx shearwater throughout the assessment. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of Manx shearwater

Manx shearwater are considered to have a low vulnerability to displacement impacts (Table A15.12) (a full justification is presented in the operational phase assessment, Appendix A15.5: Offshore Ornithology Displacement Analysis). Individuals were recorded in medium abundance during site-specific DAS surveys, with a high proportion of these likely originating from the Skomer, Skokholm and Seas off Pembrokeshire SPA. Manx shearwater are also BoCCI Amber listed and IUCN Least Concern (Table 15.16 of the 2024 EIAR). Conservation value is therefore considered to be high (Table 15.5 of the 2024 EIAR). Birds detected on DAS surveys originating from the Skomer, Skokholm and Seas off Pembrokeshire SPA are likely to be foraging in the area or passing through enroute between foraging areas and the colonies. As such, it is assumed that any displacement occurring will have minimal impact due to the species large foraging range and ability to cover large distances at low energetic cost.

Manx shearwater therefore have a low vulnerability (Table 15.4 of the 2024 EIAR), and a high conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.16 of the 2024 EIAR.

Manx shearwater are assessed using a displacement rate of 10% and a mortality rate of 1%. Displacement rates used represent half the rates used in the operational phase (Appendix A15.5: Offshore Ornithology Displacement Analysis), with a full justification of rates used provided in that section.

This assessment considers displacement risk in the PFI only, with the low number of birds recorded in the ECC meaning that the species was scoped out of the ECC assessment.

Magnitude of the impact (PFI)

During the breeding bio-season, the mean peak abundance for Manx shearwater is 3,975 individuals within the PFI plus 2km buffer. Based on 5% displacement and 1% mortality, the estimated displacement consequent mortality is two (2.0) individuals per annum.

Based on a breeding bio-season regional population size of 2,121,049 individuals (Table A15.7) and a baseline mortality of 275,736 individuals per annum (based on an average mortality rate of 0.130; Table A15.8) the addition of two displacement consequent mortalities would represent a 0.001% increase in baseline mortality.

During the autumn migration bio-season, the mean peak abundance for Manx shearwater is 458 individuals within the PFI plus 2km buffer. Based on 5% displacement and 1% mortality, the estimated displacement consequent mortality is less than one (0.2) individual per annum.

Based on an autumn migration bio-season regional population size of 1,585,521 individuals (Table A15.7) and a baseline mortality of 206,118 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of less than one displacement consequent mortality would represent a <0.001% increase in baseline mortality.

During the spring migration bio-season, no Manx shearwater were recorded within the PFI plus 2km buffer. Based on 5% displacement and 1% mortality, the estimated displacement consequent mortality is zero (0.0) individual per annum.

Based on a spring migration bio-season regional population size of 1,585,521 individuals (Table A15.7) and a baseline mortality of 206,118 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of zero displacement consequent mortality would represent a 0.000% increase in baseline mortality.

Across all bio-seasons, the total mean peak abundance of Manx shearwater in the PFI plus 2km buffer is 4,544. Based on 5% displacement and 1% mortality, the estimated displacement consequent mortality is two (2.2) individuals per annum.

Based on the largest regional population size of 2,121,049 individuals (Table A15.7) and a baseline mortality of 275,736 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of two displacement consequent mortalities would represent a 0.001% increase in baseline mortality. Considering the biogeographic population size of 2,000,000 individuals with a baseline mortality of 260,000 individuals per annum, the addition of two displacement consequent mortalities would represent a 0.001% increase in baseline mortality.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of Manx shearwater for Project Option 1 and Project Option 2 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on Manx shearwater results in an imperceptible effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.21 Predicted bio-season displacement impacts on Manx shearwater from the proposed development during the construction phase (replaces Table 15.30 of Chapter 15 in the 2024 EIAR).

| Bio-season (months) | Bio-season mean peak abundance in the PFI plus 2km buffer (+/- 95% CI) | Population size (individuals) | Estimated mortality (+/- 95% CI) | Percentage increase in baseline mortality (+/- 95% CI) |
|------------------------------------|--|-------------------------------|----------------------------------|--|
| | | | 5% displacement, 1% mortality | 5% displacement, 1% mortality |
| Autumn migration | 458.0 (211.3-758.8) | 1,585,521 | 0.2 (0.1-0.4) | 0.000% (0.000%-0.000%) |
| Breeding | 3,975.3 (2,164.5-5,939.8) | 2,121,049 | 2.0 (1.1-3.0) | 0.001% (0.000%-0.001%) |
| Spring migration | 0.0 (0.0-0.0) | 1,585,521 | 0.0 (0.0-0.0) | 0.000% (0.000%-0.000%) |
| Annual total (regional population) | 4,433.3 (2,375.8-6,698.5) | 2,121,049 | 2.2 (1.2-3.3) | 0.001% (0.000%-0.001%) |
| Annual total (biogeographic) | 4,433.3 (2,375.8-6,698.5) | 2,000,000 | 2.2 (1.2-3.3) | 0.001% (0.000%-0.001%) |

Gannet

The assessment of gannet has been updated in line with NatureScot (2023c) guidance in response to RFI 8ci. Breeding population estimates have also been revised to use Method 2, as required under RFI 8avii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of gannet

Gannet are considered to have a low to medium vulnerability to displacement impacts (a full justification is presented in operational phase, Appendix A15.5: Offshore Ornithology Displacement Analysis). Individuals were recorded in medium abundance, originating largely from the Lambay Island SPA, Ailsa Craig SPA, and Grassholm SPA, the latter two of which gannet is a qualifying interest feature, though notably a high number of immature birds not from these SPAs is also expected within the region. Gannet are also BoCCI Amber listed and IUCN Least Concern (Table 15.16 of the 2024 EIAR). Based on this, they are considered to have a medium conservation value (Table 15.5 of the 2024 EIAR).

Gannet therefore have a low to medium vulnerability (Table 15.4 of the 2024 EIAR), and a medium conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Gannet are assessed using a displacement rate of 35% and a mortality rate range of 1% to 3%. Displacement rates used represent half the rates used in the operational phase with a full justification of rates used also provided (Appendix A15.5: Offshore Ornithology Displacement Analysis).

This assessment considers displacement risk in the PFI only, with low numbers recorded in the ECC.

Magnitude of impact (PFI)

During the breeding bio-season, the mean peak abundance for gannet is 270 individuals within the PFI plus 2km buffer. Based on 35% displacement and 1% mortality, the estimated displacement consequent mortality is one (0.9) individual per annum.

Based on a breeding bio-season regional population size of 637,440 individuals (Table A15.7) and a baseline mortality of 115,118 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of one displacement consequent mortality would represent a 0.001% increase in baseline mortality. Potential impacts based on 35% displacement and 3% mortality are presented in Table A 15.22 below.

During the spring migration bio-season, the mean peak abundance for gannet is nine individuals within the PFI plus 2km buffer. Based on 35% displacement and 1% mortality, the estimated displacement consequent mortality is less than one (<0.1) individuals per annum.

Based on spring migration bio-season regional population size of 643,917 individuals (Table A15.7) and a baseline mortality of 117,193 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of less than one displacement consequent mortalities would represent a <0.001% increase in baseline mortality. Potential impacts based on 35% displacement and 3% mortality are presented in Table A 15.22 below.

During the autumn migration bio-season, the mean peak abundance for gannet is 135 individuals within the PFI plus 2km buffer. Based on 35% displacement and 1% mortality, the estimated displacement consequent mortality is one (0.5) individual per annum.

Based on autumn migration bio-season regional population size of 535,183 individuals (Table A15.7) and a baseline mortality of 97,403 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of one displacement consequent mortalities would represent a 0.001% increase in baseline mortality. Potential impacts based on 35% displacement and 3% mortality are presented in Table A 15.22 below.

Across all bio-seasons, the total mean peak abundance of gannet in the PFI plus 2km buffer is 414. Based on 35% displacement and 1% mortality, the estimated displacement consequent mortality is one (1.4) individuals per annum.

Based on the largest regional population size of 643,917 individuals (Table A15.7) and a baseline mortality of 117,193 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of one displacement consequent mortalities would represent a 0.001% increase in baseline mortality. Considering the biogeographic population size of 1,180,000, with a baseline mortality of 214,760 individuals per annum, the addition of four displacement consequent mortalities would represent a 0.001% increase in baseline mortality. Potential impacts based on 35% displacement and 3% mortality are presented in Table A 15.22 below.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of gannet for Project Option 1 and Project Option 2 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on gannet results in an imperceptible effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A 15.22 Predicted bio-season displacement impacts on gannet from the proposed development during the construction phase (replaces Table 15.31 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Bio-season mean peak abundance in the PFI plus 2km buffer (+/- 95% CI) | Population size (individuals) | Estimated mortality (individuals) (+/- 95% CI) | | Percentage increase in baseline mortality (+/- 95% CI) | |
|------------------------------|--|-------------------------------|--|--------------------------------|--|--------------------------------|
| | | | 35% displacement, 1% mortality | 35% displacement, 3% mortality | 35% displacement, 1% mortality | 35% displacement, 3% mortality |
| Autumn migration | 135.0 (64.8-213.0) | 535,183 | 0.5 (0.2-0.7) | 1.4 (0.7-2.2) | 0.001% (0.000%-0.001%) | 0.001% (0.001%-0.002%) |
| Breeding | 270.3 (130.3-445.8) | 632,514 | 0.9 (0.5-1.6) | 2.8 (1.4-4.7) | 0.001% (0.000%-0.001%) | 0.002% (0.001%-0.004%) |
| Spring migration | 8.7 (2.3-19.3) | 643,917 | 0.0 (0.0-0.1) | 0.1 (0.0-0.2) | 0.000% (0.000%-0.000%) | 0.000% (0.000%-0.000%) |
| Annual (regional population) | 413.9 (197.3-678.1) | 643,917 | 1.4 (0.7-2.4) | 4.3 (2.1-7.1) | 0.001% (0.001%-0.002%) | 0.004% (0.002%-0.006%) |
| Annual (biogeographic) | 413.9 (197.3-678.1) | 1,180,000 | 1.4 (0.7-2.4) | 4.3 (2.1-7.1) | 0.001% (0.000%-0.001%) | 0.002% (0.001%-0.003%) |

Disturbance and displacement of intertidal ornithological receptors

There are no changes to this section. Refer to Section 15.5.2 (Disturbance and displacement of intertidal ornithological receptors) of the 2024 EIAR.

Kittiwake

Kittiwake are not considered vulnerable to disturbance or displacement and are typically screened out of such assessments for UK offshore wind projects. However, in response to RFI 8cii, which requested their inclusion due to their proximity to the coast and nearby breeding colonies, a displacement assessment has been undertaken. This assessment follows the NatureScot-advised parameters of 30% displacement and 1–3% mortality. Despite completing this analysis, available evidence continues to show little to no displacement of kittiwake to construction work of OWFs. The Developer therefore maintains that kittiwake are not sensitive to displacement, but they have been assessed here in response to RFI 8cii. Breeding population estimates have also been revised to use Method 2, as required under RFI 8aviii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of kittiwake

Kittiwake are considered to have a low vulnerability to disturbance and displacement impacts (Table A15.12). A high number of individuals were recorded during surveys (with a peak abundance of 2,708 in the PFI plus 2km buffer), with individuals originating from a mixture of SPA (notably Lambay Island and Ireland's Eye SPA where kittiwake is a qualifying interest) and non-SPA colonies. They are also BoCCI Amber listed and IUCN Least Concern (Table 15.16 of the 2024 EIAR). They are therefore considered to have a medium conservation value (Table 15.15 of the 2024 EIAR).

Kittiwake therefore have a low vulnerability (Table 15.4 of the 2024 EIAR), and a medium conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.16 of the 2024 EIAR.

Kittiwake are assessed using a displacement rate of 15% and a mortality rate range of 1% to 3% which corresponds with the recommended Guidance Approach, with no alternative assessment presented for the Developer Approach. Displacement rates used represent half the rates used in the operational phase, with a full justification of rates used provided in that section (Appendix A15.5: Offshore Ornithology Displacement Analysis).

Although kittiwakes were recorded frequently within the ECC +2km buffer, this assessment considers displacement risk within the PFI plus 2km buffer, as kittiwake are not considered to be vulnerable to vessel disturbance and show a low sensitivity to disturbance from vessel activity.

Magnitude of impact

During the migration-free breeding bio-season, the mean peak abundance for kittiwake is 594 individuals within the PFI plus 2km buffer. Based on 15% displacement and 1% and 3% mortality, between one (0.9) and three (2.7) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 142,464 individuals (Table A15.7) and a baseline mortality of 22,467 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of one to three displacement consequent mortalities would represent a 0.004% and 0.012% increase in baseline mortality.

During the autumn migration bio-season, the mean peak abundance for kittiwake is 930 individuals within the PFI plus 2km buffer. Based on 15% displacement and 1% and 3% mortality, between one (1.4) and four (4.2) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on autumn migration bio-season regional population size of 933,197 individuals (Table A15.7) and a baseline mortality of 147,165 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of one to four displacement consequent mortalities would represent a 0.001% and 0.003% increase in baseline mortality.

During the spring migration bio-season, the mean peak abundance for kittiwake is 612 individuals within the PFI plus 2km buffer. Based on 15% displacement and 1% and 3% mortality, between one (0.9) and three (2.8) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on spring migration bio-season regional population size of 713,137 individuals (Table A15.7) and a baseline mortality of 112,462 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of one to three displacement consequent mortality would represent a 0.001% and 0.002% increase in baseline mortality.

Across all bio-seasons, the total mean peak abundance of kittiwake in the PFI plus 2km buffer is 2,136. Based on 15% displacement and 1% and 3% mortality, between three (3.2) and ten (9.6) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on the largest regional population size of 933,197 individuals (Table A15.7) and a baseline mortality of 147,165 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of three to ten displacement consequent mortalities would represent a 0.002% to 0.007% increase in baseline mortality. Considering the biogeographic population size of 5,100,000, with a baseline mortality of 804,270 individuals per annum, the addition of three to ten displacement consequent mortalities would represent a <0.001% to 0.001% increase in baseline mortality.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of kittiwake for Project Option 1 and Project Option 2 is low and the magnitude of the impact is negligible. The low sensitivity and negligible magnitude of the impact on kittiwake results in an imperceptible effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.23 Predicted bio-season displacement impacts on kittiwake from the proposed development during the construction phase.

| Bio-season (months) | Bio-season mean peak abundance in the PFI plus 2km buffer Estimated mortality (+/- 95% CI) | Population size (individuals) | Estimated mortality (+/- 95% CI) | | Percentage increase in baseline mortality (+/- 95% CI) | |
|--|--|-------------------------------|----------------------------------|--------------------------------|--|--------------------------------|
| | | | 15% displacement, 1% mortality | 15% displacement, 3% mortality | 15% displacement, 1% mortality | 15% displacement, 3% mortality |
| Furness approach to bio-seasons | | | | | | |
| Autumn migration | 486.0 (227.8-864.8) | 933,197 | 0.7 (0.3-1.3) | 2.2 (1.0-3.9) | 0.000% (0.000%-0.001%) | 0.001% (0.001%-0.003%) |
| Breeding | 903.0 (424.8-1,405.5) | 142,464 | 1.4 (0.6-2.1) | 4.1 (1.9-6.3) | 0.006% (0.003%-0.009%) | 0.018% (0.008%-0.028%) |
| Spring migration | 498.0 (210.7-1,046.7) | 713,137 | 0.7 (0.3-1.6) | 2.2 (0.9-4.7) | 0.001% (0.000%-0.001%) | 0.002% (0.001%-0.004%) |
| Annual (regional population) | 1,887.0 (863.2-3,316.9) | 933,197 | 2.8 (1.3-5.0) | 8.5 (3.9-14.9) | 0.002% (0.001%-0.003%) | 0.006% (0.003%-0.010%) |
| Annual (Biogeographic) | 1,887.0 (863.2-3,316.9) | 5,100,000 | 2.8 (1.3-5.0) | 8.5 (3.9-14.9) | 0.000% (0.000%-0.001%) | 0.001% (0.000%-0.002%) |
| Site-specific approach to bio-seasons | | | | | | |
| Autumn migration | 930.4 (388.0-1,582.8) | 933,197 | 1.4 (0.6-2.4) | 4.2 (1.7-7.1) | 0.001% (0.000%-0.002%) | 0.003% (0.001%-0.005%) |
| Breeding | 593.8 (290.5-979.5) | 142,464 | 0.9 (0.4-1.5) | 2.7 (1.3-4.4) | 0.004% (0.002%-0.007%) | 0.012% (0.006%-0.020%) |
| Spring migration | 611.7 (297.3-1,182.7) | 713,137 | 0.9 (0.4-1.8) | 2.8 (1.3-5.3) | 0.001% (0.000%-0.002%) | 0.002% (0.001%-0.005%) |
| Annual (regional population) | 2,135.8 (975.8-3,745.0) | 933,197 | 3.2 (1.5-5.6) | 9.6 (4.4-16.9) | 0.002% (0.001%-0.004%) | 0.007% (0.003%-0.011%) |
| Annual (Biogeographic) | 2,135.8 (975.8-3,745.0) | 5,100,000 | 3.2 (1.5-5.6) | 9.6 (4.4-16.9) | 0.000% (0.000%-0.001%) | 0.001% (0.001%-0.002%) |

15.5.2.2 *Impact 2: Indirect impacts due to impacts on prey*

There are no changes to this section. Refer to Section 15.5.2.2 of Chapter 15 in the 2024 EIAR.

15.5.2.3 *Impact 3: Indirect impacts due to accidental pollution*

There are no changes to this section. Refer to Section 15.5.2.3 of Chapter 15 in the 2024 EIAR.

15.5.2.4 *Impact 4: Impacts arising from artificial light*

There are no changes to this section. Refer to Section 15.5.2.4 of Chapter 15 in the 2024 EIAR.

15.5.3 **Operational Phase**

This section has been updated to reflect the inclusion of the additional NWIS DAS surveys, which now provide full coverage of the PFI, the PFI + 10 km buffer, and the ECC +2km. This expanded dataset was collected in direct response to RFI 8aⁱⁱ and 8aⁱⁱⁱ, which required expanded DAS data for red-throated diver. Breeding population estimates have also been revised to use Method 2, as required under RFI 8a^{vii}.

As the introduction of the PFI and the expanded DAS dataset affects species abundances and densities, all numerical values within this section have been updated accordingly. From this point forward, the subsections 15.5.3.1 to 15.5.3.4 should be considered a full replacement of the equivalent text presented in the 2024 EIAR.

15.5.3.1 *Impact 5: Disturbance and displacement (PFI)*

This section has been replaced in its entirety to reflect the revisions to the displacement assessment undertaken in direct response to the RFI. These updates include the application of NatureScot (2023) recommended displacement and mortality rates (referred to as Guidance Approach) for auks, kittiwake and gannet, alongside the Developer's evidence based parameters (referred to as Developer Approach), as required under RFI 8(cⁱ) and 8(cⁱⁱ). Species highlighted in the RFI sections, including red-throated diver, great northern diver and common scoter, have been reassessed using the updated study areas and expanded NWIS DAS dataset, with displacement buffers extended to 10 km for red-throated diver (e.g., RFI 8aⁱⁱⁱ). As these updates influence predicted displacement levels and associated mortality estimates, all numerical values within this section have been recalculated accordingly.

During the operational phase, vessel and drone activity has the potential to directly impact birds through disturbance, resulting in displacement of birds from the PFI within the array area (Bradbury *et al.*, 2014; Dierschke *et al.*, 2016; MIG-Birds, 2022). Additionally, the presence of operational infrastructure has the potential to disturb and displace seabirds. This may result in a reduced area in which those seabirds susceptible to displacement, which currently reside within and around the offshore development area, have to forage, loaf and/or moult (Bradbury *et al.*, 2014; Dierschke *et al.*, 2016). Displacement may contribute to individual birds experiencing fitness consequences, which at an extreme level could lead to the mortality of individuals (Bradbury *et al.*, 2014). It is acknowledged that vessel activity is expected to be of reduced magnitude compared to in the construction phase, and the main impacts are expected to be due to the presence of offshore infrastructure.

This section considers impacts in the PFI only. During the operational period, the main form of displacement impact is considered to come from the presence of offshore infrastructure in the PFI as a subset of the array area, with vessel activity both in the array area and ECC being lower than in the construction phase. Though there is potential for vessel activity in the ECC or to and from the maintenance port, the magnitude of impact is expected to be relatively low compared with the construction phase due to the lower number of vessels/reduced vessel activity. Since all impacts assessed for construction were not significant with negligible magnitude at worst, the potential for impacts during the operational phase is also considered to be not significant.

Seabird species vary in their response to the presence of operational infrastructure associated with OWFs and related maintenance activity (i.e., ship and helicopter traffic). Some species are known to be more susceptible to displacement than others as a result of OWF operation, with Dierschke *et al.*, (2016) finding varying responses from seabirds from strong avoidance (e.g., red-throated diver) to strong attraction (e.g. shag) to OWFs. It is noted that large gulls and shag are not considered to be at any risk of displacement impacts, with both large gulls and shag often recorded roosting/perching on offshore turbines and large gulls often recorded being attracted to vessel activity (e.g. Vanermen *et al.*, 2020; Somerfeld *et al.*, 2016; Dierschke *et al.*, 2016). The sensitivity of species to disturbance and displacement (as defined in Table 15.6 of the 2024 EIAR) is presented for each species in Table A15.24 below, with the sensitivity for each species based on a range of available data sources (e.g. Bradbury *et al.*, 2014; Garthe and Hüppop, 2004; Furness and Wade, 2012, Wade *et al.*, 2016, Dierschke *et al.*, 2016). Species with low vulnerability to disturbance and displacement are screened out of the assessment regardless of conservation status and abundance, as there is not considered to be a relevant pathway for impacts to occur on these species in this scenario. Similarly, species which have a low relative abundance are screened out on the basis that the area is not used sufficiently by these species to create an impact pathway.

Current information as to the long-term impacts of disturbance and displacement by operational infrastructure on seabirds is relatively limited, however some post construction monitoring studies (e.g., at the Beatrice OWF (MacArthur Green, 2023) and the Aberdeen OWF (Cook 2026)), are available and are considered in further detail within this report. However, displacement advice is available from the UK SNCBs who issued a joint Interim Displacement Advice Note (MIG-Birds, 2022) providing recommendations on how to present information to enable the assessment of displacement effects in relation to OWF developments. This guidance has formed the basis of the assessment provided below.

For the assessment of displacement impacts within the array area, the abundance of birds within the PFI plus 2km buffer was used (4km for common scoter and great northern diver, and 10km for red-throated diver).

Table A15.24 Screening of seabird species recorded within the PFI and relevant buffer for risk of disturbance and displacement during the operational phase (replaces Table 15.35 of Chapter 15 in the 2024 EIAR)

| Bird species | Vulnerability to disturbance and displacement (based on Bradbury <i>et al.</i> , 2014; Dierschke <i>et al.</i> , 2016) | Estimated peak abundance in the PFI plus relevant buffer ⁷ (individuals) | Frequency of presence in PFI plus relevant buffer ¹⁷ (months recorded out of 41) | Relative abundance/density in the PFI plus relevant buffer | Screening outcome |
|--------------------------|--|---|---|--|-------------------|
| Whimbrel | Low | 0 | 0 | Low | Out |
| Kittiwake | Low | 2,708 | 40 | High | In |
| Black-headed gull | Low | 23 | 4 | Low | Out |
| Little gull | Low | 0 | 0 | Low | Out |
| Common gull | Low | 181 | 16 | Low | Out |
| Great black-backed gull | Negligible | 338 | 34 | Medium | Out |
| Herring gull | Negligible | 3,055 | 37 | High | Out |
| Lesser black-backed gull | Negligible | 246 | 5 | Low | Out |
| Sandwich tern | Low | 5 | 1 | Low | Out |
| Roseate tern | Low | 702 | 10 | Medium | Out |

⁷ 4km for common scoter and great northern diver, and 10km for red-throated diver

| Bird species | Vulnerability to disturbance and displacement (based on Bradbury et al., 2014; Dierschke et al., 2016) | Estimated peak abundance in the PFI plus relevant buffer ⁷ (individuals) | Frequency of presence in PFI plus relevant buffer ¹⁷ (months recorded out of 41) | Relative abundance/density in the PFI plus relevant buffer | Screening outcome |
|----------------------|--|---|---|--|-------------------|
| Common tern | Low | 282 | 7 | Medium | Out |
| Arctic tern | Low | 616 | 7 | Medium | Out |
| Great skua | Low | 5 | 1 | Low | Out |
| Arctic skua | Low | 0 | 0 | Low | Out |
| Guillemot | Medium | 43,430 | 41 | High | In |
| Razorbill | Medium | 16,207 | 39 | High | In |
| Black guillemot | Medium | 11 | 6 | Low | Out |
| Puffin | Low to medium | 53 | 13 | Low | In |
| Red-throated diver | High | 14 | 5 | Low | In |
| Great northern diver | High | 17 | 3 | Low | Out |
| Fulmar | Low | 15 | 23 | Low | Out |
| Sooty shearwater | Low | 5 | 2 | Low | Out |
| Manx shearwater | Low | 9,176 | 25 | High | In |
| Gannet | Low to medium | 604 | 35 | Medium | In |
| Shag | Low | 3 | 1 | Low | Out |

As outlined in Section 15.4.6, both Project Option 1 and Project Option 2 have an equal potential for disturbance and displacement impacts, and therefore the magnitude of impact and significance of effect is the same for both project options in this section.

There are two approaches to displacement and mortality rates, Developer and Guidance Approach. The Developer Approach refer to rates that are preferred by the Developer where evidence from post-construction monitoring and literature reviews have indicated these are the most precautionary (for more detail see Appendix A15.5: Offshore Ornithology Displacement Analysis). The Guidance Approach refer to the rates that are advised by the NatureScot Guidance (2023).

The following Table A15.25 displays the displacement and mortality rates used in the assessment. For full details and justification for the rates used see Section 2.4 of the Appendix A15.5: Displacement Analysis.

Table A15.25 Summary of approaches for species assessed for displacement within the PFI.

| Species | Developer Approach | | Guidance Approach | | |
|--------------------|----------------------------------|---------------|-------------------|---------------------------|-------------------------------|
| | Displacement (%) | Mortality (%) | Displacement (%) | Mortality (%) Breeding | Mortality (%) Non-breeding |
| Guillemot | 50 | 1 | 60 | 3-5 | 1-3 |
| Razorbill | 50 | 1 | 60 | 3-5 | 1-3 |
| Puffin | 50 | 1 | 60 | 3-5 | 1-3 |
| Manx shearwater | 10 | 1 | - | - | - |
| Gannet | 70 | 1 | 70 | 1-3 | 1-3 |
| Red-throated Diver | 100 (PFI - 4km) 52 (4 - 10km) | 1 1 | - | - | - |
| Kittiwake | No Assessment | No Assessment | 30 | 1-3 | 1-3 |

The section evidencing the displacement and mortality rates used has been removed as this text is now all contained within the Appendix A15.5: Offshore Ornithology Displacement Analysis.

Guillemot

The assessment of auks has been updated in line with NatureScot guidance in response to RFI 8ci. Breeding population estimates have also been revised to use Method 2, as required under RFI 8aviii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area. The reduction in the array area to the PFI was partially driven by RFI 8cvi.

Sensitivity of guillemot

Guillemot are considered to have a medium vulnerability to disturbance and displacement impacts (Table A15.12). A high number of individuals were recorded during surveys, with individuals originating from a mixture of SPA (notably Lambay Island and Ireland’s Eye SPA where guillemot is a qualifying interest) and non-SPA colonies. They are also BoCCI Amber listed and IUCN Least Concern (Table 15.16 of the 2024 EIAR). They are therefore considered to have a medium conservation value (Table 15.5 16 of the 2024 EIAR).

Guillemot therefore have a medium vulnerability (Table 15.4 of the 2024 EIAR), and a medium conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Guillemot are assessed using a displacement rate of 50% and a mortality rate of 1% (Developer Approach to displacement rates), with a displacement rate of 60% displacement and a mortality rate range of 1% to 3% (non-breeding) and 3% to 5% (breeding) (Guidance Approach to displacement rates) also presented. For clarity, where the Guidance Approach includes a range, the Guidance Approach lower range is referred to as NatureScot low while the upper range is termed NatureScot high.

As outlined in Table 15.14 of the 2024 EIAR, two bio-season approaches are considered for guillemot, with a more ecologically relevant site-specific approach forming the main basis of the assessment, and results based on the Furness approach used for other species also presented.

As explained in Section 15.3.2, no model-based abundance estimates were used within this assessment; all abundance estimates are therefore design-based.

Magnitude of impact

The abundance of guillemot within the PFI plus 2km buffer and across the NWIS cSPA support the shortened breeding bio-season for guillemot. During 2020, 2022 and 2025 the core breeding season when birds are constrained clearly falls within the months of May and June (Appendix A15.1: Offshore and Intertidal Ornithology Technical Baseline: Section 2.12 Guillemot bio-seasons; Appendix A15.2: MRSea Modelling for Offshore Ornithology). By July, birds had dispersed more widely across the NWIS cSPA and beyond. In July 2021, the distribution of guillemot is more constrained compared to the other July surveys, potentially showing a later dispersal of birds from colonies during this year.

During the breeding season, the mean peak abundance for guillemot is 988 individuals within the PFI plus 2km buffer. Based on 50% displacement and 1% mortality, five (4.9) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 190,073 individuals (Table A15.7) and a baseline mortality of 26,800 individuals per annum (based on an average mortality rate of 0.141; Table A15.8), the addition of five displacement consequent mortalities would represent a 0.018% increase in baseline mortality. Potential impacts based on 60% displacement and 3% and 5% mortality, and based on the Furness approach to bio-seasons, are presented in Table A15.26 below.

During the non-breeding bio-season, the mean peak abundance for guillemot is 21,074 individuals within the PFI plus 2km buffer. Based on 50% displacement and 1% mortality, 105 (105.4) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on a non-breeding bio-season regional population size of 1,332,623 individuals (Table A15.7) and a baseline mortality of 187,900 individuals per annum (based on an average mortality rate of 0.141; Table A15.7), the addition of 105 displacement consequent mortalities would represent a 0.056% increase in baseline mortality. Potential impacts based on 60% displacement and 1% and 3% mortality, and based on the Furness approach to bio-seasons are presented in Table A15.26 below.

Across all bio-seasons, the total mean peak abundance of guillemot in the PFI plus 2km buffer is 22,061. Based on 50% displacement and 1% mortality, 110 (110.3) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on the largest regional population size of 1,332,623 individuals (Table A15.7) and a baseline mortality of 187,900 individuals per annum (based on an average mortality rate of 0.141; Table A15.8), the addition of 110 displacement consequent mortalities would represent a 0.059% increase in baseline mortality. Considering the biogeographic population size of 4,125,000, with a baseline mortality of 581,625 individuals per annum, the addition of 110 displacement consequent mortalities would represent a 0.019% increase in baseline mortality. Potential impacts based on the Guidance Approach to displacement and mortality rates are presented in Table A15.26 below.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each Site-specific approach to bio-seasons and summed across all Site-specific approach to bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

However, as the percentage increase in baseline mortality at the breeding population level using the Furness approach to bio-seasons exceeds 1%, further consideration in the form of a Population Viability Analysis (PVA) is given with results presented in Table A15.64. Full details of the PVA analysis are provided in Appendix A15.6: Offshore Ornithology Population Viability Analysis.

Metrics used for the interpretation of PVA outputs are the Counterfactual Growth Rate (CGR) and Counterfactual Population Size (CPS) values, which present the relative difference in growth rate of a population or population size between two or more scenarios, including a baseline scenario and an impacted scenario.

For the Furness approach to bio-seasons, the total breeding mortalities of the NatureScot low equates to 144 individuals per annum which results in a CGR and CPS of 1.000 and 0.996 respectively. For the NatureScot high, there are 490 individual breeding total mortalities per annum which results in a CGR and CPS of 0.997 and 0.901 respectively. Over the 35-year timeframe, this represents a 0.290% reduction in annual growth rate. Overall, the PVA results for the Furness approach to bio-seasons indicate that even under the most precautionary (NatureScot high) scenario, population-level effects remain very small. The highest estimated additional mortality (490 adults per year) results in a CGR of 0.997 and a CPS of 0.901, equivalent to a 0.29% reduction in annual growth rate over 35 years. This level of change is well within natural year-to-year fluctuations and would not lead to any long-term adverse effect on the population.

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be low (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of guillemot for Project Option 1 and Project Option 2 is medium and the magnitude of the impact is low. The medium sensitivity and low magnitude of the impact on guillemot results in a slight effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.26 Predicted bio-season displacement impacts on guillemot from the proposed development during the operational phase (replaces Table 15.38 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Bio-season mean peak abundance in the PFI +2km buffer Estimated mortality (+/- 95% CI) | Population size (individuals) | Estimated mortality (+/- 95% CI) | | | Percentage increase in baseline mortality (+/- 95% CI) | | |
|--|--|-------------------------------|----------------------------------|---------------------------------------|---------------------------------------|--|---------------------------------------|---------------------------------------|
| | | | 50% displacement, 1% mortality | 60% displacement, 1% and 3% mortality | 60% displacement, 3% and 5% mortality | 50% displacement, 1% mortality | 60% displacement, 1% and 3% mortality | 60% displacement, 3% and 5% mortality |
| Furness approach to bio-seasons | | | | | | | | |
| Breeding | 16,318.3 (8,345.3-25,924.3) | 190,073 | 81.6 (41.7-129.6) | 293.7 (150.2-466.6) | 489.5 (250.4-777.7) | 0.306% (0.156%-0.485%) | 1.100% (0.562%-1.747%) | 1.833% (0.938%-2.912%) |
| Non-breeding | 18,766.2 (11,201.0-26,523.4) | 1,332,623 | 93.8 (56.0-132.6) | 112.6 (67.2-159.1) | 337.8 (201.6-477.4) | 0.050% (0.030%-0.071%) | 0.060% (0.036%-0.085%) | 0.180% (0.108%-0.255%) |
| Annual (regional population) | 35,084.5 (19,546.3-52,447.7) | 1,332,623 | 175.4 (97.7-262.2) | 406.3 (217.4-625.8) | 827.3 (452.0-1,255.1) | 0.093% (0.052%-0.140%) | 0.216% (0.116%-0.333%) | 0.440% (0.241%-0.001%) |
| Annual (Biogeographic) | 35,084.5 (19,546.3-52,447.7) | 4,125,000 | 175.4 (97.7-262.2) | 406.3 (217.4-625.8) | 827.3 (452.0-1,255.1) | 0.030% (0.017%-0.045%) | 0.070% (0.038%-0.108%) | 0.143% (0.078%-0.000%) |
| Site-specific approach to bio-seasons | | | | | | | | |
| Breeding | 987.5 (715.8-1,278.5) | 190,073 | 4.9 (3.6-6.4) | 17.8 (12.9-23.0) | 29.6 (21.5-38.4) | 0.018% (0.013%-0.024%) | 0.067% (0.048%-0.086%) | 0.111% (0.081%-0.144%) |
| Non-breeding | 21,073.8 (12,387.6-31,292.6) | 1,332,623 | 105.4 (61.9-156.5) | 126.4 (74.3-187.8) | 379.3 (223.0-563.3) | 0.056% (0.033%-0.084%) | 0.068% (0.040%-0.100%) | 0.203% (0.119%-0.301%) |
| Annual (regional population) | 35,084.5 (19,546.3-52,447.7) | 1,332,623 | 110.3 (65.5-162.9) | 144.2 (87.2-210.8) | 409.0 (244.4-601.6) | 0.059% (0.035%-0.087%) | 0.077% (0.046%-0.112%) | 0.218% (0.130%-0.320%) |
| Annual (Biogeographic) | 22,061.3 (13,103.4-32,571.1) | 4,125,000 | 110.3 (65.5-162.9) | 144.2 (87.2-210.8) | 409.0 (244.4-601.6) | 0.019% (0.011%-0.028%) | 0.025% (0.015%-0.036%) | 0.071% (0.042%-0.104%) |

Razorbill

The assessment of auks has been updated in line with NatureScot 2023 guidance in response to RFI 8ci. Breeding population estimates have also been revised to use Method 2, as required under RFI 8avii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area. The reduction in the array area to the PFI was partially driven by RFI 8cvi.

Sensitivity of razorbill

Razorbill are considered to have a medium vulnerability to disturbance and displacement impacts (Table A15.12). A high number of individuals were recorded during site-specific surveys, with individuals originating from a mixture of SPAs (notably Lambay Island and Ireland's Eye SPA where razorbill is a qualifying interest) and non-SPA colonies. They are also BoCCI Amber listed and IUCN Least Concern (Table 15.16 of the 2024 EIAR). They are therefore considered to have a medium conservation value (Table 15.5 of the 2024 EIAR).

Razorbill therefore have a medium vulnerability Table 15.4 of the 2024 EIAR, and a medium conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Razorbill are assessed using a displacement rate of 50% and a mortality rate of 1% (Developer Approach to displacement rates), with a displacement rate of 60% displacement and a mortality rate range of 1% to 3% (non-breeding) and 3% to 5% (breeding) (Guidance Approach to displacement rates) also presented. For clarity, where the Guidance Approach includes a range, the Guidance Approach lower range is referred to as NatureScot low while the upper range is termed NatureScot high.

Magnitude of impact

The abundance of razorbill within the PFI plus 2km buffer was estimated using both design-based and model-based methods. There was variation between months on which method produced the highest abundance. However, the mean peak abundance for the breeding season (and two of the three non-breeding bio-seasons) was lower for the model-based approach (see MRSea Modelling Report). The largest reductions in abundances were in the breeding season and the autumn migration which showed a 30% reduction in the predicted abundance compared with the design-based estimates. Therefore, a precautionous approach of design-based abundance estimates were used in the displacement assessment in this addendum (the same approach as used for guillemot and other displacement species). Nevertheless, this does not mean that the modelled estimates provide a less accurate prediction of the true number and distribution of birds throughout the PFI plus 2km buffer, and they should be considered in relation to the conclusions provided for razorbill.

During the breeding season, the mean peak abundance for razorbill is 175 individuals within the PFI plus 2km buffer. Based on 50% displacement and 1% mortality, one (0.9) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 49,298 individuals (Table A15.7) and a baseline mortality of 6,359 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of one displacement consequent mortality would represent a 0.014% increase in baseline mortality. Potential impacts based on 60% displacement and 3% and 5% mortality, and on the Furness approach to bio-seasons, are presented in Table A15.27 below.

During the autumn migration bio-season, the mean peak abundance for razorbill is 4,896 individuals within the PFI plus 2km buffer. Based on 50% displacement and 1% mortality, 25 (24.5) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on an autumn migration bio-season regional population size of 632,453 individuals (Table A15.7) and a baseline mortality of 81,586 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of 25 displacement consequent mortalities would represent a 0.030% increase in baseline mortality. Potential impacts based on 60% displacement and 1% and 3% mortality, and based on the Furness approach to bio-seasons, are presented in Table A15.27 below.

During the spring migration bio-season, the mean peak abundance for razorbill is 1,225 individuals within the PFI plus 2km buffer. Based on 50% displacement and 1% mortality, six (6.1) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on a spring migration bio-season regional population size of 632,453 individuals (Table A15.7) and a baseline mortality of 81,586 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of six displacement consequent mortalities would represent a 0.013% increase in baseline mortality. Potential impacts based on 60% displacement and 1% and 3% mortality, and based on the Furness approach to bio-seasons, are presented in Table A15.27 below.

During the migration-free winter bio-season, the mean peak abundance for razorbill is 915.3 individuals within the PFI plus 2km buffer. Based on 50% displacement and 1% mortality, five (4.6) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on a migration-free winter bio-season regional population size of 366,961 individuals (Table A15.7) and a baseline mortality of 47,338 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of five displacement consequent mortalities would represent a 0.006% increase in baseline mortality. Potential impacts based on 60% displacement and 1% and 3% mortality, and based on the Furness approach to bio-seasons, are presented in Table A15.27 below.

Across all bio-seasons, the total mean peak abundance of razorbill in the PFI plus 2km buffer is 8,146. Based on 50% displacement and 1% mortality, 36 (36.1) individuals are predicted to be at risk of displacement consequent mortality per annum. Impacts for the annual total are presented in a displacement matrix in Table A15.27 below.

Based on the largest regional population size of 632,453 individuals (Table A15.7) and a baseline mortality of 81,586 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of 36 displacement consequent mortalities would represent a 0.044% increase in baseline mortality. Considering the biogeographic population size of 1,707,000, with a baseline mortality of 220,203 individuals per annum, the addition of 49 displacement consequent mortalities would represent a 0.016% increase in baseline mortality. Potential impacts based on the Guidance Approach to displacement and mortality rates are presented in Table A15.27 below.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of razorbill for Project Option 1 and Project Option 2 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on razorbill results in an imperceptible effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.27 Predicted bio-season displacement impacts on razorbill from the proposed development during the operational phase (replaces Table 15.40 of Chapter 15 in the 2024 EIAR).

| Bio-season (months) | Bio-season mean peak abundance in the PFI +2km buffer (+/- 95% CI) | Population size (individuals) | Estimated mortality (individuals) (+/- 95% CI) | | | Percentage increase in baseline mortality (+/- 95% CI) | | |
|--|--|-------------------------------|--|---------------------------------------|---------------------------------------|--|---------------------------------------|---------------------------------------|
| | | | 50% displacement, 1% mortality | 60% displacement, 1% and 3% mortality | 60% displacement, 3% and 5% mortality | 50% displacement, 1% mortality | 60% displacement, 1% and 3% mortality | 60% displacement, 3% and 5% mortality |
| Furness approach to bio-seasons | | | | | | | | |
| Autumn migration | 4,895.8 (1,994.6-8,086.6) | 632,453 | 24.5 (10.0-40.4) | 29.4 (12.0-48.5) | 88.1 (35.9-145.6) | 0.030% (0.012%-0.049%) | 0.036% (0.015%-0.059%) | 0.107% (0.044%-0.177%) |
| Breeding | 1,109.5 (417.5-1,777.8) | 49,298 | 5.5 (2.1-8.9) | 20.0 (7.5-32.0) | 33.3 (12.5-53.3) | 0.086% (0.033%-0.139%) | 0.312% (0.117%-0.499%) | 0.519% (0.195%-0.830%) |
| Spring migration | 1,225.3 (469.7-2,009.7) | 366,961 | 6.1 (2.3-10.0) | 7.4 (2.8-12.1) | 22.1 (8.5-36.2) | 0.013% (0.005%-0.021%) | 0.015% (0.006%-0.025%) | 0.046% (0.018%-0.076%) |
| Migration-free winter | 915.3 (669.0-1,180.0) | 632,453 | 4.6 (3.3-5.9) | 5.5 (4.0-7.1) | 16.5 (12.0-21.2) | 0.006% (0.004%-0.007%) | 0.007% (0.005%-0.009%) | 0.020% (0.015%-0.026%) |
| Annual (regional population) | 8,146.0 (3,550.8-13,054.0) | 632,453 | 40.7 (17.8-65.3) | 62.2 (26.3-99.7) | 159.9 (68.9-256.3) | 0.049% (0.022%-0.079%) | 0.076% (0.032%-0.121%) | 0.194% (0.084%-0.311%) |
| Annual (biogeographic) | 8,146.0 (3,550.8-13,054.0) | 1,707,000 | 40.7 (17.8-65.3) | 62.2 (26.3-99.7) | 159.9 (68.9-256.3) | 0.018% (0.008%-0.029%) | 0.028% (0.012%-0.045%) | 0.072% (0.031%-0.115%) |
| Site-specific approach to bio-seasons | | | | | | | | |
| Autumn migration | 4,895.8 (1,994.6-8,086.6) | 632,453 | 24.5 (10.0-40.4) | 29.4 (12.0-48.5) | 88.1 (35.9-145.6) | 0.030% (0.012%-0.049%) | 0.036% (0.015%-0.059%) | 0.107% (0.044%-0.177%) |

| Bio-season (months) | Bio-season mean peak abundance in the PFI +2km buffer (+/- 95% CI) | Population size (individuals) | Estimated mortality (individuals) (+/- 95% CI) | | | Percentage increase in baseline mortality (+/- 95% CI) | | |
|------------------------------|--|-------------------------------|--|---------------------------------------|---------------------------------------|--|---------------------------------------|---------------------------------------|
| | | | 50% displacement, 1% mortality | 60% displacement, 1% and 3% mortality | 60% displacement, 3% and 5% mortality | 50% displacement, 1% mortality | 60% displacement, 1% and 3% mortality | 60% displacement, 3% and 5% mortality |
| Breeding | 175.0 (95.0-257.5) | 49,298 | 0.9 (0.5-1.3) | 3.2 (1.7-4.6) | 5.3 (2.9-7.7) | 0.014% (0.008%-0.020%) | 0.050% (0.026%-0.072%) | 0.083% (0.045%-0.120%) |
| Spring migration | 1,225.3 (469.7-2,009.7) | 366,961 | 6.1 (2.3-10.0) | 7.4 (2.8-12.1) | 22.1 (8.5-36.2) | 0.013% (0.005%-0.021%) | 0.015% (0.006%-0.025%) | 0.046% (0.018%-0.076%) |
| Migration-free winter | 915.3 (669.0-1,180.0) | 632,453 | 4.6 (3.3-5.9) | 5.5 (4.0-7.1) | 16.5 (12.0-21.2) | 0.006% (0.004%-0.007%) | 0.007% (0.005%-0.009%) | 0.020% (0.015%-0.026%) |
| Annual (regional population) | 7,211.5 (3,228.3-11,533.8) | 632,453 | 36.1 (16.1-57.7) | 45.4 (20.5-72.3) | 131.9 (59.2-210.7) | 0.044% (0.020%-0.070%) | 0.055% (0.025%-0.088%) | 0.160% (0.072%-0.256%) |
| Annual (biogeographic) | 7,211.5 (3,228.3-11,533.8) | 1,707,000 | 36.1 (16.1-57.7) | 45.4 (20.5-72.3) | 131.9 (59.2-210.7) | 0.016% (0.007%-0.026%) | 0.020% (0.009%-0.033%) | 0.059% (0.027%-0.095%) |

Puffin

The assessment of auks has been updated in line with NatureScot 2023 guidance in response to RFI 8ci. Breeding population estimates have also been revised to use Method 2, as required under RFI 8avii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area. The reduction in the array area to the PFI was partially driven by RFI 8cvi.

Sensitivity of puffin

Puffin are considered to have a low to medium vulnerability to disturbance and displacement impacts (Table A15.12). During surveys, a low number of individuals were recorded. Recorded individuals are assumed to originate from a number of designated and non-designated sites, including Lambay Island SPA where puffin is a qualifying interest. Puffin are also BoCCI Amber listed and IUCN Vulnerable (Table 15.16 of the 2024 EIAR). They are therefore considered to have a medium conservation value (Table 15.5 of the 2024 EIAR).

Puffin therefore have a medium vulnerability and recoverability, and a medium conservation value, with an overall receptor sensitivity assessed as medium.

Puffin are assessed using a displacement rate of 50% and a mortality rate of 1% (Developer Approach to displacement rates), with a displacement rate of 60% displacement and a mortality rate range of 1% to 3% (non-breeding) and 3% to 5% (breeding) (Guidance Approach to displacement rates) also presented. For clarity, where the Guidance Approach includes a range, the Guidance Approach lower range is referred to as NatureScot low while the upper range is termed NatureScot high.

Magnitude of impact

During the breeding season, the mean peak abundance for puffin is 17 (17.3) individuals within the PFI plus 2km buffer. Based on 50% displacement and 1% mortality, less than one (0.1) individual is predicted to be at risk of displacement consequent mortality per annum. Based on 60% displacement and 3% and 5% mortality, the estimated displacement consequent mortality is between less than one (0.3) and one (0.5) individual per annum.

Based on a breeding bio-season regional population size of 79,939 individuals (Table A15.7) and a baseline mortality of 9,513 individuals per annum (based on an average mortality rate of 0.119; Table A15.8), the addition of less than one displacement consequent mortality would represent a 0.001% increase in baseline mortality. Potential impacts based on 60% displacement and 3% and 5% mortality are presented in Table A15.28 below.

During the non-breeding season, the mean peak abundance for puffin is 14 individuals within the PFI plus 2km buffer. Based on 50% displacement and 1% mortality, less than one (0.1) individual is predicted to be at risk of displacement consequent mortality per annum. Based on 60% displacement and 1% and 3% mortality, the estimated displacement consequent mortality is less than one (0.1) and less than one (0.3) individual per annum.

Based on a non-breeding bio-season regional population size of 300,427 individuals (Table A15.7) and a baseline mortality of 35,751 individuals per annum (based on an average mortality rate of 0.119; Table A15.8), the addition of less than one displacement consequent mortalities would represent a <0.001% increase in baseline mortality. Potential impacts based on 60% displacement and 1% and 3% mortality are presented in Table A15.28 below.

Across all bio-seasons, the total mean peak abundance of puffin in the PFI plus 2km buffer is 32. Based on 50% displacement and 1% mortality, less than one (0.2) individual is predicted to be at risk of displacement consequent mortality per annum. Based on NatureScot mortality rate, the estimated displacement consequent mortality is between less than one (0.4) and one (0.8) individual per annum. Impacts for the annual total are presented in a displacement matrix in Table A15.28 below.

Based on the largest regional population size of 300,427 individuals (Table A15.7) and a baseline mortality of 35,751 individuals per annum (based on an average mortality rate of 0.119; Table A15.8), the addition of less than one displacement consequent mortalities would represent a 0.001% increase in baseline mortality.

Considering the biogeographic population size of 11,840,000, with a baseline mortality of 2,083,840 individuals per annum, the addition of less than one displacement consequent mortalities would represent a <0.001% increase in baseline mortality. Potential impacts based on mortality rate are presented in Table A15.28 below.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of puffin for Project Option 1 and Project Option 2 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on puffin results in an imperceptible effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.28 Predicted bio-season displacement impacts on puffin from the proposed development during the operational phase (replaces Table 15.42 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Bio-season mean peak abundance in the PFI +2km buffer (+/- 95% CI) | Population size (individuals) | Estimated mortality (+/- 95% CI) | | | Percentage increase in baseline mortality (+/- 95% CI) | | |
|------------------------------|--|-------------------------------|----------------------------------|---------------------------------------|---------------------------------------|--|---------------------------------------|---------------------------------------|
| | | | 50% displacement, 1% mortality | 60% displacement, 1% and 3% mortality | 60% displacement, 3% and 5% mortality | 50% displacement, 1% mortality | 60% displacement, 1% and 3% mortality | 60% displacement, 3% and 5% mortality |
| Breeding | 17.3 (7.0-30.8) | 79,939 | 0.1 (0.0-0.2) | 0.3 (0.1-0.6) | 0.5 (0.2-0.9) | 0.001% (0.000%-0.002%) | 0.003% (0.001%-0.006%) | 0.005% (0.002%-0.009%) |
| Non-breeding | 14.2 (2.8-40.2) | 300,427 | 0.1 (0.0-0.2) | 0.1 (0.0-0.2) | 0.3 (0.1-0.7) | 0.000% (0.000%-0.001%) | 0.000% (0.000%-0.001%) | 0.001% (0.000%-0.002%) |
| Annual (regional population) | 31.5 (9.8-71.0) | 300,427 | 0.2 (0.0-0.4) | 0.4 (0.1-0.8) | 0.8 (0.3-1.6) | 0.001% (0.000%-0.001%) | 0.001% (0.000%-0.002%) | 0.002% (0.001%-0.004%) |
| Annual (biogeographic) | 31.5 (9.8-71.0) | 11,840,000 | 0.2 (0.0-0.4) | 0.4 (0.1-0.8) | 0.8 (0.3-1.6) | 0.000% (0.000%-0.000%) | 0.000% (0.000%-0.000%) | 0.000% (0.000%-0.000%) |

Manx shearwater

Breeding population estimates have been revised to use Method 2 for all other species, as required under RFI 8avii. For Manx shearwater, the Method 2 population estimate is not the most precautionary approach considering this population is greater than Method 1. As a result, Method 1 population estimate has been used for Manx shearwater throughout the assessment. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of Manx shearwater

Manx shearwater are considered to be at low to very low vulnerability to displacement impacts (Bradbury *et al.*, 2014; Dierschke *et al.*, 2016), though it is also noted that there is uncertainty with their displacement risk (Wade *et al.*, 2016). Guidance on the assessment of Manx shearwater for displacement impacts is limited, however based on information provided in Bradbury *et al.* (2014), Manx shearwater are assigned the lowest score for both disturbance susceptibility and habitat specialisation, suggesting very low potential displacement sensitivity. They are therefore considered to have a low vulnerability to displacement impacts (Table A15.24). To reflect their low risk a displacement rate of 10% is considered appropriate and sufficiently precautionary. No range-based values are presented for Manx shearwater; this approach is also recommended by UK SNCB guidance (MIG-Birds, 2022).

Manx shearwater were recorded in medium abundance during surveys, with a high proportion of these originating from the Skomer, Skokholm and Seas off Pembrokeshire SPA, and birds also using the North-West Irish SPA. Manx shearwater are also BoCCI Amber listed (Table 15.16 of the 2024 EIAR). Conservation value is therefore considered to be high (Table 15.5 of the 2024 EIAR).

Manx shearwater therefore have a low vulnerability (Table 15.4 of the 2024 EIAR), and a high conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Manx shearwater are assessed using a displacement rate of 10% and a mortality rate of 1%.

Magnitude of impact

During the breeding bio-season, the mean peak abundance for Manx shearwater is 3,975 individuals within the PFI plus 2km buffer. Based on 10% displacement and 1% mortality, the estimated displacement consequent mortality is four (4.0) individuals per annum.

Based on a breeding bio-season regional population size of 2,121,049 individuals (Table A15.7) and a baseline mortality of 275,736 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of one displacement consequent mortalities would represent a 0.001% increase in baseline mortality.

During the autumn migration bio-season, the mean peak abundance for Manx shearwater is 458.0 individuals within the PFI plus 2km buffer. Based on 10% displacement and 1% mortality, the estimated displacement consequent mortality is one (0.5) individual per annum.

Based on an autumn migration bio-season regional population size of 1,585,521 individuals (Table A15.7) and a baseline mortality of 206,118 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of one displacement consequent mortality would represent a 0.000% increase in baseline mortality.

During the spring migration bio-season, no Manx shearwater were recorded within the PFI plus 2km buffer. Based on 10% displacement and 1% mortality, the estimated displacement consequent mortality is zero (0.0) individual per annum.

Based on a spring migration bio-season regional population size of 1,585,521 individuals (Table A15.7) and a baseline mortality of 206,118 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of zero displacement consequent mortality would represent a 0.000% increase in baseline mortality.

Across all bio-seasons, the total mean peak abundance of Manx shearwater in the PFI plus 2km buffer is 4,433. Based on 10% displacement and 1% mortality, the estimated displacement consequent mortality is four (4.4) individuals per annum. Impacts for the annual total are presented in a displacement matrix in Table A15.29 below.

Based on the largest regional population size of 2,121,049 individuals (Table A15.7) and a baseline mortality of 275,736 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of four displacement consequent mortalities would represent a 0.002% increase in baseline mortality. Considering the biogeographic population size of 2,000,000 individuals with a baseline mortality of 260,000 individuals per annum, the addition of five displacement consequent mortalities would represent a 0.002% increase in baseline mortality.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of Manx shearwater for Project Option 1 and Project Option 2 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on Manx shearwater results in an imperceptible effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.29 Predicted bio-season displacement impacts on Manx shearwater from the proposed development during the operational phase (replaces Table 15.44 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Bio-season mean peak abundance in the PFI +2km buffer (+/- 95% CI) | Population size (individuals) | Estimated mortality (+/- 95% CI) | Percentage increase in baseline mortality (+/- 95% CI) |
|------------------------------------|--|-------------------------------|----------------------------------|--|
| | | | 10% displacement, 1% mortality | 10% displacement, 1% mortality |
| Autumn migration | 458.0 (211.3-758.8) | 1,585,521 | 0.5 (0.2-0.8) | 0.000% (0.000%-0.000%) |
| Breeding | 3,975.3 (2,164.5-5,939.8) | 2,121,049 | 4.0 (2.2-5.9) | 0.001% (0.001%-0.002%) |
| Spring migration | 0.0 (0.0-0.0) | 1,585,521 | 0.0 (0.0-0.0) | 0.000% (0.000%-0.000%) |
| Annual total (regional population) | 4,433.3 (2,375.8-6,698.5) | 1,585,521 | 4.4 (2.4-6.7) | 0.002% (0.001%-0.002%) |
| Annual total (biogeographic) | 4,433.3 (2,375.8-6,698.5) | 2,000,000 | 4.4 (2.4-6.7) | 0.002% (0.001%-0.003%) |

Gannet

The gannet displacement assessment has been adjusted to follow NatureScot 2023 guidance, with an upper range of 3% mortality added, in response to RFI 8ci. Breeding population estimates have also been revised to use Method 2, as required under RFI 8avii. All impacts have been recalculated based on the abundance and density estimates for the refined PFI rather than the full array area. The reduction in the array area to the PFI was partially driven by RFI 8cvi.

Sensitivity of gannet

Gannet show a low level of sensitivity to ship and helicopter traffic (Garthe and Hüppop, 2004; Furness and Wade, 2012). A study by Krijgsveld *et al.*, (2011) using radar and visual observations to monitor the post-construction effects of the OWEZ established that 64% of gannet avoided entering the wind farm. Similar data is available from a study at Thanet wind farm, finding 80% of gannet avoided the OWF (Skov *et al.*, 2018), and from APEM (APEM, 2014) which found the rate to be 95% of gannet on migrations based on data for several OWFs. More recently, a Natural England report (Pavat *et al.*, 2023) illustrated that a mean OWF avoidance rate for gannet was 86% (based on an evidence-based review of nine studies). Based on the above evidence, and following NatureScot guidance as requested, a rate of 70% is considered the most appropriate while still sufficiently precautionary.

Gannet are highly flexible in their habitat use, able to use a wide range of habitats over a large area (Furness and Wade, 2012). They also have a large foraging range (mean-maximum of 315km and maximum of 709km), and feed on a variety of different prey items, meaning they are likely to be able to find sufficient alternative foraging opportunities despite any potential displacement effects as a result of the proposed development. A precautionary mortality rate of 1% is therefore used in the assessment, noting that actual rates are likely to be lower. An upper mortality rate of 3% was also presented in line with current NatureScot guidance.

Evidence on gannet vulnerability and recoverability to disturbance and displacement is varied (e.g., low in some studies, but possibly high according to Dierschke *et al.*, (2016)). Overall, vulnerability and recoverability is considered to be low to medium (Table A15.24).

As outlined in Section 15.5.2, gannet have a medium conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Gannet therefore have an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Gannet are assessed using a displacement rate of 70% and a mortality rate range of 1% to 3%, however the Developer Approach to displacement is to use the 70% displacement rate and 1% mortality rate only.

Magnitude of impact

During the breeding bio-season, the mean peak abundance for gannet is 270 individuals within the PFI plus 2km buffer. Based on 70% displacement and 1% mortality, two (1.9) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 632,514 individuals (Table A15.7) and a baseline mortality of 118,280 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of two displacement consequent mortalities would represent a 0.002% increase in baseline mortality. Potential impacts based on 70% displacement and 3% mortality are presented in Table A15.30.

During the autumn migration bio-season, the mean peak abundance for gannet is 135 individuals within the PFI plus 2km buffer. Based on 70% displacement and 1% mortality, one (0.9) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on autumn migration bio-season regional population size of 535,183 individuals (Table A15.7) and a baseline mortality of 100,079 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of one displacement consequent mortalities would represent a 0.001% increase in baseline mortality. Potential impacts based on 70% displacement and 3% mortality are presented in Table A15.30.

During the spring migration bio-season, the mean peak abundance for gannet is nine individuals within the PFI plus 2km buffer. Based on 70% displacement and 1%, less than one (0.1) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on spring migration bio-season regional population size of 643,917 individuals (Table A15.7) and a baseline mortality of 120,412 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of less than one displacement consequent mortality would represent a <0.001% increase in baseline mortality. Potential impacts based on 70% displacement and 3% mortality are presented in Table A15.30.

Across all bio-seasons, the total mean peak abundance of gannet in the PFI plus 2km buffer is 414. Based on 70% displacement and 1% , three (2.9) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on the largest regional population size of 643,917 individuals (Table A15.7) and a baseline mortality of 120,412 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of three displacement consequent mortalities would represent a 0.002% increase in baseline mortality. Considering the biogeographic population size of 1,180,000, with a baseline mortality of 214,760 individuals per annum, the addition of three displacement consequent mortalities would represent a 0.004% increase in baseline mortality. Potential impacts based on 70% displacement and 3% mortality are presented in Table A15.30.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of gannet for Project Option 1 and Project Option 2 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on gannet results in an imperceptible effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.30 Predicted bio-season displacement impacts on gannet from the proposed development during the operational phase (replaces Table 15.46 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Bio-season mean peak abundance (PFI plus 2km buffer) | Population size (individuals) | Estimated mortality (individuals) | | Percentage increase in baseline mortality | |
|------------------------------|--|-------------------------------|-----------------------------------|--------------------------------|---|--------------------------------|
| | | | 70% displacement, 1% mortality | 70% displacement, 3% mortality | 70% displacement, 1% mortality | 70% displacement, 3% mortality |
| Autumn migration | 135.0 (64.8-213.0) | 535,183 | 0.9 (0.5-1.5) | 2.8 (1.4-4.5) | 0.001% (0.001%-0.002%) | 0.003% (0.001%-0.005%) |
| Breeding | 270.3 (130.3-445.8) | 632,514 | 1.9 (0.9-3.1) | 5.7 (2.7-9.4) | 0.002% (0.001%-0.003%) | 0.005% (0.002%-0.008%) |
| Spring migration | 8.7 (2.3-19.3) | 643,917 | 0.1 (0.0-0.1) | 0.2 (0.0-0.4) | 0.000% (0.000%-0.000%) | 0.000% (0.000%-0.000%) |
| Annual (regional population) | 413.9 (197.3-678.1) | 643,917 | 2.9 (1.4-4.7) | 8.7 (4.1-14.2) | 0.002% (0.001%-0.004%) | 0.007% (0.003%-0.012%) |
| Annual (Biogeographic) | 413.9 (197.3-678.1) | 1,180,000 | 2.9 (1.4-4.7) | 8.7 (4.1-14.2) | 0.001% (0.001%-0.002%) | 0.004% (0.002%-0.006%) |

Kittiwake

Kittiwake are not considered vulnerable to disturbance or displacement and are typically screened out of such assessments in UK offshore wind projects. However, in response to RFI 8cii, which requested their inclusion due to the proposed development proximity to the coast and nearby breeding colonies, a displacement assessment has been undertaken. This assessment follows the NatureScot-advised parameters of 30% displacement and 1–3% mortality. Despite completing this analysis, available evidence continues to show little to no displacement of kittiwake at operational OWFs (e.g. Beatrice OWF (Trinder *et al.*, 2024) and early phase North Sea OWFs (Lamb *et al.*, 2024). The Developer therefore maintains that kittiwake are not sensitive to displacement, but they have been assessed here in response to RFI 8cii.

Sensitivity of kittiwake

Kittiwake are considered to have a low vulnerability to disturbance and displacement impacts (Table A15.12). A high number of individuals were recorded during surveys, with individuals originating from a mixture of SPA (notably Lambay Island and Ireland's Eye SPA where kittiwake is a qualifying interest) and non-SPA colonies. They are also BoCCI Amber listed and IUCN Least Concern (Table 15.16 of the 2024 EIAR). They are therefore considered to have a medium conservation value (Table 15.5 of the 2024 EIAR).

Kittiwake therefore have a low vulnerability (Table 15.4 of the 2024 EIAR), and a medium conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Kittiwake are assessed using a displacement rate of 30% and a mortality rate range of 1% to 3% which represents a Guidance Approach, with no displacement assessment for the Developer Approach.

Magnitude of impact

During the migration-free breeding bio-season, the mean peak abundance for kittiwake is 594 individuals within the PFI plus 2km buffer. Based on 30% displacement and 1% and 3% mortality, between two (1.8) and five (5.3) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 142,464 individuals (Table A15.7) and a baseline mortality of 22,509 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of two and five displacement consequent mortalities would represent a 0.008% and 0.024% increase in baseline mortality.

During the autumn migration bio-season, the mean peak abundance for kittiwake is 930 individuals within the PFI plus 2km buffer. Based on 30% displacement and 1% and 3% mortality, between three (2.8) and eight (8.4) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on autumn migration bio-season regional population size of 933,197 individuals (Table A15.7) and a baseline mortality of 147,165 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of three to eight displacement consequent mortalities would represent a 0.002% and 0.006% increase in baseline mortality.

During the spring migration bio-season, the mean peak abundance for kittiwake is 612 individuals within the PFI plus 2km buffer. Based on 30% displacement and 1% and 3% mortality, between two (1.8) and six (5.5) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on spring migration bio-season regional population size of 713,137 individuals (Table A15.7) and a baseline mortality of 112,462 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of two and six displacement consequent mortality would represent a 0.002% and 0.005% increase in baseline mortality.

Across all bio-seasons, the total mean peak abundance of kittiwake in the PFI plus 2km buffer is 2,136. Based on 30% displacement and 1% and 3% mortality, between six (6.4) and 19 (19.2) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on the largest regional population size of 933,197 individuals (Table A15.7) and a baseline mortality of 147,165 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of six and 19 displacement consequent mortalities would represent a 0.004% and 0.013% increase in baseline mortality. Considering the biogeographic population size of 5,100,000, with a baseline mortality of 804,270 individuals per annum, the addition of six to 19 displacement consequent mortalities would represent a 0.001% to 0.002% increase in baseline mortality.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of kittiwake for Project Option 1 and Project Option 2 is low and the magnitude of the impact is negligible. The low sensitivity and negligible magnitude of the impact on kittiwake results in an imperceptible effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.31 Predicted bio-season displacement impacts on kittiwake from the proposed development during the operational phase

| Bio-season (months) | Bio-season mean peak abundance in the PFI +2km buffer Estimated mortality (+/- 95% CI) | Population size (individuals) | Estimated mortality (+/- 95% CI) | | Percentage increase in baseline mortality (+/- 95% CI) | |
|--|---|-------------------------------|----------------------------------|--------------------------------|--|--------------------------------|
| | | | 30% displacement, 1% mortality | 30% displacement, 3% mortality | 30% displacement, 1% mortality | 30% displacement, 3% mortality |
| Furness approach to bio-seasons | | | | | | |
| Autumn migration | 486.0 (227.8-864.8) | 933,197 | 1.5 (0.7-2.6) | 4.4 (2.0-7.8) | 0.001% (0.000%-0.002%) | 0.003% (0.001%-0.005%) |
| Breeding | 903.0 (424.8-1,405.5) | 142,464 | 2.7 (1.3-4.2) | 8.1 (3.8-12.6) | 0.012% (0.006%-0.019%) | 0.036% (0.017%-0.056%) |
| Spring migration | 498.0 (210.7-1,046.7) | 713,137 | 1.5 (0.6-3.1) | 4.5 (1.9-9.4) | 0.001% (0.001%-0.003%) | 0.004% (0.002%-0.008%) |
| Annual (regional population) | 1,887.0 (863.2-3,316.9) | 933,197 | 5.7 (2.6-10.0) | 17.0 (7.8-29.9) | 0.004% (0.002%-0.007%) | 0.012% (0.005%-0.020%) |
| Annual (Biogeographic) | 1,887.0 (863.2-3,316.9) | 5,100,000 | 5.7 (2.6-10.0) | 17.0 (7.8-29.9) | 0.001% (0.000%-0.001%) | 0.002% (0.001%-0.004%) |
| Site-specific approach to bio-seasons | | | | | | |
| Autumn migration | 930.4 (388.0-1,582.8) | 933,197 | 2.8 (1.2-4.7) | 8.4 (3.5-14.2) | 0.002% (0.001%-0.003%) | 0.006% (0.002%-0.010%) |
| Breeding | 593.8 (290.5-979.5) | 142,464 | 1.8 (0.9-2.9) | 5.3 (2.6-8.8) | 0.008% (0.004%-0.013%) | 0.024% (0.012%-0.039%) |
| Spring migration | 611.7 (297.3-1,182.7) | 713,137 | 1.8 (0.9-3.5) | 5.5 (2.7-10.6) | 0.002% (0.001%-0.003%) | 0.005% (0.002%-0.009%) |
| Annual (regional population) | 2,135.8 (975.8-3,745.0) | 933,197 | 6.4 (2.9-11.2) | 19.2 (8.8-33.7) | 0.004% (0.002%-0.008%) | 0.013% (0.006%-0.023%) |
| Annual (Biogeographic) | 2,135.8 (975.8-3,745.0) | 5,100,000 | 6.4 (2.9-11.2) | 19.2 (8.8-33.7) | 0.001% (0.000%-0.001%) | 0.002% (0.001%-0.004%) |

Red-throated diver

The red-throated diver assessment has been updated to include displacement effects from the PFI out to 10km, in response to RFI 8ciii. The assessment now relies solely on the NWIS DAS dataset, as it provides the most recent, highest-resolution, and widest spatial-coverage data available, making it the most appropriate dataset for assessing both the ECC +2km buffer and the PFI + 10 km buffer.

Sensitivity of red-throated diver

Red-throated diver are considered to have a high vulnerability to disturbance and displacement impacts (Table A15.24). Red-throated diver commonly avoid areas associated with shipping (e.g. Bellebaum *et al.*, 2006; Irwin *et al.*, 2019; Jarrett *et al.*, 2018; Schwemmer *et al.*, 2011), with birds recorded flushing due to the presence of ships up to 2km from the vessels, though the majority are expected to flush at 1km or less (Bellebaum *et al.*, 2006; Jarrett *et al.*, 2018; Topping and Petersen, 2011).

As outlined in Section 15.5.2, red-throated diver have a high conservation value, with overall receptor sensitivity assessed as high based on the matrix approach in Table 15.6 of the 2024 EIAR.

Red-throated diver therefore have a high vulnerability (Table 15.4 of the 2024 EIAR), and a high conservation value, with overall receptor sensitivity assessed as high based on the matrix approach in Table 15.6 of the 2024 EIAR .

Red-throated diver are assessed using a displacement rate of 100% and a mortality rate of 1% within the PFI plus a 4km buffer, and a displacement rate of 52% and a mortality rate of 1% within the 4 to 10km buffer. A range of 90% to 100% displacement in the PFI plus 4km buffer, 52% displacement in the 4km to 10km buffer, and a mortality range of 1% to 10% also presented.

Magnitude of impact

In the spring migration bio-season, no birds were recorded within the PFI plus 4km buffer, with a peak abundance of 117 in the 4 to 10km buffer. Of these, the total displacement consequent mortality is estimated at less than one (0.6) individual, based on 100% displacement and 1% mortality in the PFI plus 4km buffer, and 52% displacement and 1% mortality in the 4km to 10km buffer.

Assuming a spring migration regional population size of 12,717 individuals, with an annual baseline mortality of 2,850 individuals per annum (derived from an average mortality rate of 0.224; Table A15.7). The addition of less than one individual would represent a 0.021% increase in baseline mortality based on 100% displacement and 1% mortality in the PFI plus 4km buffer, and 52% displacement and 1% mortality in the 4km to 10km buffer. Potential impacts based on a displacement range of 90% to 100% in the array, 52% mortality in the 4km to 10km buffer, and a mortality range of 1% to 5% are presented in Table A15.32.

In the autumn migration bio-season, a peak abundance of 7 birds were estimated within the array area plus 4km buffer, with a peak abundance of 163 in the 4 to 10km buffer. Of these, the total displacement consequent mortality is estimated at less than one (0.9) individual, based on 100% displacement and 1% mortality in the PFI plus 4km buffer, and 52% displacement and 1% mortality in the 4km to 10km buffer.

Assuming an autumn migration regional population size of 12,717 individuals, with an annual baseline mortality of 2,850 individuals per annum (derived from an average mortality rate of 0.224; Table A15.7). The addition of less than one individual would represent a 0.032% increase in baseline mortality based on 100% displacement and 1% mortality in the PFI plus 4km buffer, and 52% displacement and 1% mortality in the 4km to 10km buffer. Potential impacts based on a displacement range of 90% to 100% in the array, 52% mortality in the 4km to 10km buffer, and a mortality range of 1% to 5% are presented in Table A15.32.

In the migration-free winter bio-season, a peak abundance of 14 birds were estimated within the PFI plus 4km buffer, with a peak abundance of 85 in the 4 to 10km buffer. Of these, the total displacement consequent mortality is estimated at less than one (0.6) individual, based on 100% displacement and 1% mortality in the PFI plus 4km buffer and 52% displacement and 1% mortality in the 4km to 10km buffer.

Assuming a migration-free winter regional population size of 4,148 individuals, with an annual baseline mortality of 929 individuals per annum (derived from an average mortality rate of 0.224; Table A15.7).

The addition of less than one individual would represent a 0.063% increase in baseline mortality based on 100% displacement in the PFI plus 4km buffer and 1% mortality and 52% displacement and 1% mortality in the 4km to 10km buffer. Potential impacts based on a displacement range of 90% to 100% in the array, 52% mortality in the 4km to 10km buffer, and a mortality range of 1% to 5% are presented in Table A15.32.

Across all non-breeding bio-seasons combined the total estimated number of red-throated diver at risk of displacement is 21 in the PFI plus 4km buffer, and 365 in the 4km to 10km buffer. Of these, the total displacement consequent mortality is estimated at two (2.1) individuals, based on 100% displacement and 1% mortality in the PFI plus 4km buffer and 52% displacement and 1% mortality in the 4km to 10km buffer. Impacts for the annual total are presented in a displacement matrix in Table A15.32 (PFI plus 4km buffer) and (4km to 10km buffer).

Considering the largest regional population of 12,717 individuals, and an annual baseline mortality of 2,850 individuals per annum, the addition of two individuals would represent a 0.074% increase in baseline mortality. Based on the biogeographic population of 27,000 individuals, and a baseline mortality of 6,050 individuals per annum, the addition of two individuals would represent a 0.035% increase in baseline mortality. Potential impacts based on a displacement range of 90% to 100% in the array, 52% mortality in the 4km to 10km buffer, and a mortality range of 1% to 105 are presented in Table A15.32.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of red-throated diver for Project Option 1 and Project Option 2 is high and the magnitude of the impact is negligible. The high sensitivity and negligible magnitude of the impact on red-throated diver results in a not significant effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.32 Predicted bio-season displacement impacts on red-throated diver from the proposed development during the operational phase

| Bio-season (months) | Bio-season mean peak abundance (PFI plus relevant buffer) | Population size (individuals) | Estimated mortality (individuals) | | Percentage increase in baseline mortality | |
|------------------------------|---|-------------------------------|---|---|---|---|
| | | | 100% displacement, 1% mortality (PFI + 4km buffer) 52% displacement, 1 % mortality (4-10km buffer) | 90% to 100% displacement, 1% to 10% mortality (PFI + 4km buffer) 52% displacement, 1 % mortality (4-10km buffer) | 100% displacement, 1% mortality (PFI + 4km buffer) 52% displacement, 1 % mortality (4-10km buffer) | 90% to 100% displacement, 1% to 10% mortality (PFI + 4km buffer) 52% displacement, 1 % mortality (4-10km buffer) |
| Spring migration | 0 (PFI + 4km) 117 (4km – 10km) | 12,717 | 0.61 | 0.61 | 0.021 | 0.021 |
| Autumn migration | 7 (PFI + 4km) 163 (4km – 10km) | 12,717 | 0.92 | 0.91 – 1.55 | 0.032 | 0.032 – 0.054 |
| Migration-free winter | 14 (PFI + 4km) 85 (4km – 10km) | 4,148 | 0.58 | 0.57 – 1.84 | 0.063 | 0.061 – 0.198 |
| Annual (regional population) | 21 (PFI + 4km) 365 (4km – 10km) | 12,717 | 2.11 | 2.09 - 4.00 | 0.074 | 0.073 - 0.140 |
| Annual (biogeographic) | 21 (PFI + 4km) 365 (4km – 10km) | 27,000 | 2.11 | 2.09 - 4.00 | 0.035 | 0.035 – 0.066 |

15.5.3.2 Impact 6: Collision risk

This section has been replaced in its entirety to reflect the revisions to the collision risk modelling undertaken in direct response to the RFI 8a and 8c. These updates include the adoption of the latest Joint SNCB CRM guidance (JNCC, 2024) and integration of the expanded NWIS DAS dataset. In addition, species highlighted in the RFI (such as roseate tern, kittiwake and gannet) have been re-evaluated using revised CRM assumptions. As these updates influence collision estimates and associated mortality estimates, all values within this section have been recalculated accordingly. For full details see the Appendix A15.3: Offshore Ornithology Collision Risk Modelling Assessment.

There is potential risk to birds from OWFs through collision with WTGs resulting in injury or mortality. This may occur when birds fly through the array area whilst foraging for food, commuting between breeding sites and foraging areas, or during migration.

To evaluate which species should be included in the collision risk assessment, a screening exercise was undertaken, considering all species recorded in flight in the PFI. Species were screened in if they were considered susceptible to collision impacts, and if a high abundance of birds in flight were recorded in the PFI during site-specific DAS. Species with low vulnerability to collision are screened out of the assessment regardless of conservation status and abundance, as there is not considered to be a pathway for impacts to occur on these species in this scenario. Similarly, species which have a low relative density are screened out on the basis that the area is not used enough by these species to create an impact pathway. Sensitivity values are based on information provided in Garthe and Huppopp, (2004), Furness and Wade (2012), Bradbury *et al.*, (2014), and Wade *et al.*, (2016). The outcome of the screening exercise is presented in Table A15.33 below.

Table A15.33 Screening of seabird species recorded within the PFI for risk of collision with WTGs during the operational phase (replaces Table 15.47 of Chapter 15 in the 2024 EIAR)

| Bird species | Sensitivity to collision with WTGs | Estimated peak density in the PFI (birds/km ²) | Frequency of presence in PFI (months recorded out of 41) | Relative density/frequency in the PFI | Screening outcome |
|--------------------------|------------------------------------|--|--|---------------------------------------|-------------------|
| Kittiwake | Medium | 20.4 | 38 | High | In |
| Black-headed gull | Medium | <0.1 | 1 | Low | In |
| Little gull | Medium | <0.1 | 0 | Low | Out |
| Common gull | Medium | 1.3 | 13 | Low | In |
| Great black-backed gull | High | 4.8 | 26 | Medium | In |
| Herring gull | High | 29.1 | 31 | High | In |
| Lesser black-backed gull | High | 1.8 | 3 | Low | In |
| Sandwich tern | Low | <0.1 | 0 | Low | Out |
| Roseate tern | Low | 5.3 | 6 | Medium | In |
| Common tern | Low | 2.0 | 5 | Medium | In |
| Arctic tern | Low | 3.6 | 4 | Medium | In |
| Great skua | High | <0.1 | 1 | Low | Out |
| Arctic skua | Medium | <0.1 | 0 | Low | Out |
| Guillemot | Very low | 347.5 | 41 | High | Out |
| Razorbill | Very low | 109.5 | 38 | High | Out |
| Black guillemot | Low | <0.1 | 4 | Low | Out |
| Puffin | Very low | 0.2 | 9 | Low | Out |
| Red-throated diver | Low | 0.1 | 2 | Low | Out |
| Great northern diver | Low | <0.1 | 1 | Low | Out |
| Fulmar | Low | 0.1 | 5 | Low | In |
| Sooty shearwater | Low | <0.1 | 1 | Low | Out |

| Bird species | Sensitivity to collision with WTGs | Estimated peak density in the PFI (birds/km ²) | Frequency of presence in PFI (months recorded out of 41) | Relative density/frequency in the PFI | Screening outcome |
|-----------------|------------------------------------|--|--|---------------------------------------|-------------------|
| Manx shearwater | Low | 88.7 | 18 | High | In |
| Gannet | Medium | 6.2 | 29 | Medium | In |
| Shag | Very low | <0.1 | 0 | Low | Out |

Following the screening exercise, 12 species were included in the CRM analysis. It should be noted that despite their low sensitivity to collision impacts, Manx shearwater, fulmar, black-headed gull, common gull, Arctic tern, common tern and roseate tern have been screened in as a precautionary approach owing to their designation as a qualifying interest of the NWIS cSPA. Though little gull is also designated at this site, only 1 individual was recorded in the DAS data and therefore densities are sufficiently low that no impact pathway is expected to be present for this species.

CRM was undertaken stochastically using the sCRM, developed by Marine Scotland (McGregor, 2018; Caneco *et al.*, 2022), to determine the risk of collision when in flight for each seabird species. The development and testing of the sCRM was funded by Marine Scotland Science (MSS) and provides the most up-to-date version of the CRM (version 0.2.1; Caneco & Humphries, 2025) originally created by Band (2012) and addresses the uncertainty in developments and other key input parameters as progressed initially by Masden (2015). The sample-size achieved, and the confidence in site-specific flight height data was low. Therefore, CRM was undertaken using Band Option 2, which uses generic estimates of flight height for each species to estimate the proportion of birds at Collision Height (PCH) (Johnston *et al.*, 2014). Generic flight heights were preferred because they are derived from a very large dataset collected across a range of seasons and behaviours for each species to produce the most robust dataset available on flight height distributions. For more information please refer to Appendix A15.3: Offshore Ornithology Collision Risk Modelling Assessment.

The CRM assessment accounts for several different species-specific behavioural aspects of the seabirds being assessed. This included their flight heights, their ability to avoid moving or static structures, and how active they are diurnally and nocturnally.

To incorporate variation in CRM model input parameters, the model was run using the mean values and SDs. Input parameters used are provided in the Appendix A15.3: Offshore Ornithology Collision Risk Modelling Assessment.

For the collision risk assessments, the monthly bootstrapped density values of birds recorded in flight, calculated from the survey data, were used. This method is now the standard approach used across UK projects because it provides an accurate representation of monthly density along with associated density distribution. Full details are provided in the Appendix A15.3: Offshore Ornithology Collision Risk Modelling Assessment.

Avoidance rates and nocturnal activity rates have been taken from the most recent Collision Risk Modelling guidance from the JNCC (JNCC, 2024), which is based on the best available published evidence including Furness (2018), Bowgen and Cook (2018) and the latest Natural England interim advice (Natural England, 2022). Further information on rates used is provided in the Appendix A15.3: Offshore Ornithology Collision Risk Modelling Assessment.

Rates used are considered precautionary, with the assessment therefore presenting a scenario with the greatest potential magnitude of impact. For example, a study by APEM (2014) found that avoidance rates shown by gannet were certainly higher than rates recommended by UK SNCBs, and may even be as high as 100% during migratory periods. However, the conclusion from this study was the recommendation of 99.5% avoidance for the autumn migration. Additionally, a Bird Collision Avoidance Study funded by Offshore Renewables Joint Industry Programme (ORJIP) was undertaken to understand seabird behaviour in and around OWFs (Skov *et al.*, 2018). The study reported that only six birds (all gull species) collided with WTGs from over 12,000 birds recorded during the two-year period, providing evidence of the precautionary nature of collision risk modelling for all species of seabirds. Additionally, a report undertaken at Aberdeen

Offshore Wind Farm Limited (AOWFL, 2023) at the European Offshore Wind Development Centre (EOWC) found that collision rates of birds are likely to be significantly lower than predicted based on input parameters, implying further precaution of the current methodology used. The two-year study used a combination of radar and video analysis to look at turbine avoidance and found that no collisions or even narrow escapes were recorded in over 10,000 bird videos, highlighting that actual avoidance rates are likely to be even higher. Further review was carried out using collision monitoring data collected at the EOWDC between 2023 and 2024 (Cook, 2026). The study employed a Spoor AI camera-based system to quantify bird interactions with turbines. Over the 19-month monitoring period, a total of 2,007 bird tracks were recorded, with results indicating that birds remained within the wind farm for longer periods than assumed in the collision models. The monitoring also confirmed that no collision events occurred, leading to an estimated collision rate of just 0.002.

Table A15.34 Monthly collision estimates for seabirds for the proposed development based on Band Option 2, with values expressed as the mean and the 95% confidence intervals in brackets (replaces Table 15.48 of Chapter 15 in the 2024 EIAR)

| Month | Species | | | | | | | | | | | | |
|-------------------------|-------------------|-------------------|------------------|-------------------------|--------------------|--------------------------|------------------|------------------|------------------|------------------|------------------|--------------------------------|-----------------------------|
| | Kittiwake | Black-headed gull | Common gull | Great black-backed gull | Herring gull | Lesser black-backed gull | Roseate tern | Common tern | Arctic tern | Fulmar | Manx shearwater | Gannet without macro-avoidance | Gannet with macro-avoidance |
| Project Option 1 | | | | | | | | | | | | | |
| Jan | 3.7 (0.2–15.5) | 0.0 (0.0–0.0) | 0.8 (0.0–2.6) | 1.9 (0.0–6.9) | 11.4 (0.9–32.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.3) | 0.0 (0.0–0.0) |
| Feb | 0.7 (0.0–2.1) | 0.0 (0.0–0.0) | 0.5 (0.0–2.1) | 2.6 (0.0–8.2) | 2.2 (0.0–8.2) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.1 (0.0–0.6) | 0.0 (0.0–0.1) |
| Mar | 2.0 (0.0–7.2) | 0.0 (0.0–0.0) | 0.1 (0.0–0.6) | 2.4 (0.0–6.4) | 2.4 (0.0–7.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.1 (0.0–0.5) | 0.0 (0.0–0.2) |
| Apr | 0.2 (0.0–0.6) | 0.0 (0.0–0.0) | 0.1 (0.0–0.5) | 0.3 (0.0–2.2) | 0.6 (0.0–1.9) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.2 (0.0–1.1) | 0.0 (0.0–0.1) |
| May | 0.3 (0.0–1.1) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.2 (0.0–2.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.2) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.2 (0.0–0.9) | 0.1 (0.0–0.3) |
| Jun | 0.2 (0.0–0.7) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 1.1 (0.0–4.5) | 0.0 (0.0–0.0) | 0.1 (0.0–0.4) | 0.1 (0.0–0.5) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.9 (0.0–5.2) | 0.1 (0.0–0.3) |
| Jul | 4.4 (0.0–25.1) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.4 (0.0–2.3) | 7.0 (0.0–41.3) | 0.5 (0.0–5.2) | 0.2 (0.0–1.3) | 0.3 (0.0–1.6) | 0.0 (0.0–0.3) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.4 (0.0–1.8) | 0.3 (0.0–1.6) |
| Aug | 2.5 (0.0–13.3) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 1.3 (0.0–7.9) | 4.6 (0.0–33.0) | 0.5 (0.0–3.6) | 0.8 (0.0–4.4) | 0.3 (0.0–2.0) | 0.2 (0.0–1.9) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 1.4 (0.0–5.4) | 0.1 (0.0–0.5) |
| Sep | 0.6 (0.0–3.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.3 (0.0–1.7) | 0.5 (0.0–3.2) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.1) | 0.0 (0.0–0.0) | 0.3 (0.0–1.9) | 0.4 (0.0–1.6) |
| Oct | 1.1 (0.0–4.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.4) | 1.0 (0.0–3.9) | 1.2 (0.0–7.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.2) | 0.0 (0.0–0.0) | 0.1 (0.0–0.8) | 0.1 (0.0–0.6) |

| Month | Species | | | | | | | | | | | | |
|-------------------------|----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|--------------------------------|
| | Kittiwake | Black-headed gull | Common gull | Great black-backed gull | Herring gull | Lesser black-backed gull | Roseate tern | Common tern | Arctic tern | Fulmar | Manx shearwater | Gannet without macro-avoidance | Gannet with macro-avoidance |
| Nov | 1.1 (0.0–2.7) | 0.0 (0.0–0.3) | 1.2 (0.0–5.6) | 2.6 (0.0–12.6) | 7.4 (0.0–41.4) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.2) |
| Dec | 1.1 (0.0–2.8) | 0.0 (0.0–0.0) | 0.2 (0.0–0.9) | 0.4 (0.0–1.7) | 3.8 (0.0–10.1) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.3) | 0.0 (0.0–0.0) |
| Annual | 17.9 (0.2–77.8) | 0.0 (0.0–0.3) | 3.0 (0.0–12.6) | 13.4 (0.0–53.9) | 42.4 (0.9–191.6) | 1.0 (0.0–8.8) | 1.2 (0.0–6.4) | 0.6 (0.0–4.0) | 0.3 (0.0–2.3) | 0.0 (0.0–0.4) | 0.0 (0.0–0.0) | 3.7 (0.0–18.5) | 1.1 (0.0–5.5) |
| Project Option 2 | | | | | | | | | | | | | |
| Jan | 3.2 (0.2–13.1) | 0.0 (0.0–0.0) | 0.7 (0.0–2.1) | 1.5 (0.0–4.9) | 9.6 (0.9–26.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) |
| Feb | 0.6 (0.0–1.9) | 0.0 (0.0–0.0) | 0.4 (0.0–1.7) | 2.1 (0.0–6.3) | 1.8 (0.0–7.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.2) | 0.0 (0.0–0.1) |
| Mar | 1.7 (0.0–6.2) | 0.0 (0.0–0.0) | 0.1 (0.0–0.5) | 1.8 (0.0–4.7) | 1.9 (0.0–5.2) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.1 (0.0–0.5) | 0.0 (0.0–0.1) |
| Apr | 0.2 (0.0–0.6) | 0.0 (0.0–0.0) | 0.1 (0.0–0.4) | 0.2 (0.0–1.8) | 0.4 (0.0–1.5) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.3) | 0.0 (0.0–0.1) |
| May | 0.3 (0.0–1.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.2 (0.0–1.5) | 0.0 (0.0–0.0) | 0.0 (0.0–0.2) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.1 (0.0–0.8) | 0.0 (0.0–0.3) |
| Jun | 0.2 (0.0–0.5) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.9 (0.0–3.9) | 0.0 (0.0–0.0) | 0.1 (0.0–0.4) | 0.1 (0.0–0.4) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.2 (0.0–0.7) | 0.0 (0.0–0.2) |
| Jul | 4.2 (0.0–23.9) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.3 (0.0–2.0) | 5.3 (0.0–30.2) | 0.4 (0.0–3.6) | 0.2 (0.0–1.2) | 0.3 (0.0–1.4) | 0.0 (0.0–0.3) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.8 (0.0–4.4) | 0.2 (0.0–1.3) |
| Aug | 2.2 (0.0–11.5) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 1.1 (0.0–6.0) | 4.0 (0.0–29.1) | 0.4 (0.0–2.7) | 0.7 (0.0–3.9) | 0.3 (0.0–1.9) | 0.3 (0.0–2.3) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.3 (0.0–1.4) | 0.1 (0.0–0.4) |

| Month | Species | | | | | | | | | | | | |
|---------------|----------------------------------|--------------------------------|---------------------------------|----------------------------------|-----------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|--------------------------------|
| | Kittiwake | Black-headed gull | Common gull | Great black-backed gull | Herring gull | Lesser black-backed gull | Roseate tern | Common tern | Arctic tern | Fulmar | Manx shearwater | Gannet without macro-avoidance | Gannet with macro-avoidance |
| Sep | 0.5 (0.0–2.5) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.3 (0.0–1.3) | 0.4 (0.0–2.6) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.1) | 0.0 (0.0–0.0) | 1.2 (0.0–4.3) | 0.3 (0.0–1.3) |
| Oct | 1.0 (0.0–3.4) | 0.0 (0.0–0.0) | 0.0 (0.0–0.3) | 0.8 (0.0–3.0) | 0.9 (0.0–5.3) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.2) | 0.0 (0.0–0.0) | 0.3 (0.0–1.9) | 0.1 (0.0–0.6) |
| Nov | 1.0 (0.0–2.4) | 0.0 (0.0–0.2) | 1.1 (0.0–4.8) | 2.0 (0.0–9.6) | 5.6 (0.0–30.9) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.1 (0.0–0.7) | 0.0 (0.0–0.2) |
| Dec | 1.0 (0.0–2.5) | 0.0 (0.0–0.0) | 0.2 (0.0–0.8) | 0.3 (0.0–1.3) | 2.9 (0.0–7.8) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) | 0.0 (0.0–0.0) |
| Annual | 16.0 (0.3–69.5) | 0.0 (0.0–0.2) | 2.6 (0.0–10.5) | 10.4 (0.0–40.9) | 33.9 (0.9–150.9) | 0.8 (0.0–6.3) | 1.0 (0.0–5.8) | 0.6 (0.0–3.7) | 0.3 (0.0–2.6) | 0.0 (0.0–0.3) | 0.0 (0.0–0.0) | 3.0 (0.0–15.3) | 0.9 (0.0–4.6) |

As outlined above, the scenario with the greatest potential magnitude of likely significant effects from both Project Option 1 or Project Option 2 is determined on a species-by-species basis based on CRM results in Table A15.34.

Kittiwake

Breeding population estimates have been revised to use Method 2, as required under RFI 8avii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of kittiwake

Kittiwake are considered to have a high vulnerability to collision impacts (Table A15.33). A high number of individuals were recorded during surveys, with considerable connectivity to the Lambay Island SPA expected, of which kittiwake is a qualifying interest. Kittiwake are also BoCCI Amber listed and IUCN Vulnerable (Table 15.16 of the 2024 EIAR). Based on these criteria, kittiwake could be assessed as having either a high or medium conservation value (i.e., high connectivity to a designated site, but relatively low conservation status). However, as a precautionary approach they are given a conservation value of high (Table 15.5 of the 2024 EIAR).

Kittiwake therefore have high vulnerability (Table 15.4 of the 2024 EIAR), and a high conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as high based on the matrix approach in Table 15.6 of the 2024 EIAR.

Magnitude of impact

During the migration-free breeding bio-season, five (4.9) kittiwake are predicted to be at risk of collision mortality. Based on a breeding bio-season regional population size of 142,464 individuals (Table A15.7) and a baseline mortality of 22,509 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of 10 collision mortalities would represent a 0.022% increase in baseline mortality.

During the spring migration bio-season four (6.5) kittiwake are predicted to be at risk of collision mortality. Based on a spring migration bio-season regional population size of 713,137 individuals (Table A15.7) and a baseline mortality of 112,462 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of four collision mortalities would represent a 0.006% increase in baseline mortality.

During the autumn migration bio-season four (6.4) kittiwake are predicted to be at risk of collision mortality. Based on an autumn migration bio-season regional population size of 933,197 individuals (Table A15.7) and a baseline mortality of 147,165 individuals per annum (based on an average mortality rate of 0.158; Table A15.8) the addition of four collision mortalities would represent a 0.004% increase in baseline mortality.

Across all bio-seasons, a total of 18 (17.9) kittiwake are predicted to be at risk of collision mortality. Based on the largest regional population of 933,197 individuals (Table A15.7) and a baseline mortality of 147,165 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of 18 collision mortalities would represent a 0.012% increase in baseline mortality. Considering the biogeographic population of 5,100,000 individuals (Table A15.7) and a baseline mortality of 804,270 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of 18 collision mortalities would represent a 0.002% increase in baseline mortality. The full range of results is presented in Table A15.35 below.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from collision risk would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Project Option 1

Overall, it is predicted that the sensitivity of kittiwake for Project Option 1 is high and the magnitude of the impact is negligible. The high sensitivity and negligible magnitude of the impact on kittiwake results in a not significant effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the high sensitivity and negligible magnitude of the impact on kittiwake results in a not significant effect at worst, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.35 Predicted bio-season collision impacts on kittiwake from the proposed development (Project Option 1) during the operational phase (replaces Table 15.49 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Population size (individuals) | Estimated mortality (individuals) (+/- 95% CI) | Percentage increase in baseline mortality (+/- 95% CI) |
|----------------------------------|-------------------------------|--|--|
| Full breeding bio-season | | | |
| Autumn migration | 933,197 | 3.9 (0.0–12.4) | 0.003% (0.000%–0.008%) |
| Full breeding | 142,464 | 9.6 (0.0–47.9) | 0.043% (0.000%–0.213%) |
| Spring migration | 713,137 | 4.3 (0.2–17.6) | 0.004% (0.000%–0.016%) |
| Annual (regional population) | 933,197 | 17.9 (0.2–77.8) | 0.012% (0.000%–0.053%) |
| Annual (Biogeographic) | 5,100,000 | 17.9 (0.2–77.8) | 0.002% (0.000%–0.010%) |
| Migration-free bio-season | | | |
| Autumn migration | 933,197 | 6.4 (0.0–25.7) | 0.004% (0.000%–0.017%) |
| Migration-free breeding | 142,464 | 4.9 (0.0–26.8) | 0.022% (0.000%–0.119%) |
| Spring migration | 713,137 | 6.5 (0.2–25.3) | 0.006% (0.000%–0.023%) |
| Annual (regional population) | 933,197 | 17.9 (0.2–77.8) | 0.012% (0.000%–0.053%) |
| Annual (Biogeographic) | 5,100,000 | 17.9 (0.2–77.8) | 0.002% (0.000%–0.010%) |

Black-headed gull

Breeding population estimates have been revised to use Method 2, as required under RFI 8avii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of black-headed gull

Black-headed gull are considered to have a medium vulnerability to collision impacts (Table A15.33). A low number of individuals were recorded during aerial surveys, and with limited connectivity to designated sites other than the NWIS cSPA where they are a non-breeding feature. Black-headed gull are also BoCCI Amber listed and IUCN Least Concern (Table 15.16 of the 2024 EIAR). Conservation status is therefore considered to be medium (Table 15.5 of the 2024 EIAR).

Black-headed gull therefore have medium vulnerability, and a medium conservation value, with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Magnitude of impact

Across the 41 months of DAS data collection, a total of six black-headed gull were recorded within the PFI (all of which were flying). Based on the CRM assessment (presented in the Appendix A15.3: Offshore Ornithology Collision Risk Modelling Assessment), a total of less than 0.1 collision mortalities are predicted. Based on the very low magnitude of impact predicted, potential collision effects on black-headed gull are not considered further here, with a magnitude of negligible predicted for Project Option 1 and Project Option 2 (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of black-headed gull for Project Option 1 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on black-headed gull results in an imperceptible effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the medium sensitivity and negligible magnitude of the impact on black-headed gull results in an imperceptible effect at worst, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Common gull

The regional population has been revised in response to RFI 8aviii, and breeding population estimates have been revised to use Method 2, as required under RFI 8avii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of common gull

Common gull are considered to have a medium vulnerability to collision impacts (Table A15.33). A low number of individuals were recorded during DAS, and with limited connectivity to designated sites other than the NWIS cSPA in the non-breeding season only. Common gull are also BoCCI Amber listed and IUCN Least Concern (Table 15.16 of the 2024 EIAR). Conservation status is therefore considered to be medium.

Common gull therefore have medium vulnerability (Table 15.4 of the 2024 EIAR), and a medium conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIA.

Magnitude of impact

During the breeding season, over the four breeding seasons recorded by DAS, only two individuals were observed in the PFI (both of which in April). Common gull is therefore screened out for impacts in the breeding season, and consideration of impacts is only given for the non-breeding season.

During the non-breeding bio-season three (3.0) common gull are predicted to be at risk of collision mortality. Based on a non-breeding bio-season regional population size of 11,030 individuals (Table A15.7) and a baseline mortality of 2,791 individuals per annum (based on an average mortality rate of 0.253; Table A15.8), the addition of five collision mortalities would represent a 0.108% increase in baseline mortality.

An annual total collision impact of three (3.1) common gull was estimated. Based on a regional population of 11,030 individuals and a baseline mortality of 2,791 individuals per annum (based on an average mortality rate of 0.253; Table A15.8), the addition of three collision mortalities would represent a 0.110% increase in baseline mortality. The full range of results is presented in Table A15.36 below.

At the regional population, the impacts from the proposed development across all bio-seasons alone and combined represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from collision risk would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Project Option 1

Overall, it is predicted that the sensitivity of common gull for Project Option 1 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on common gull results in an imperceptible effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the medium sensitivity and negligible magnitude of the impact on common gull results in an imperceptible effect at worst, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.36 Predicted bio-season collision impacts on common gull from the proposed development (Project Option1) during the operational phase (replaces Table 15.50 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Population size (individuals) | Estimated mortality (individuals) (+/- 95% CI) | Percentage increase in baseline mortality (+/- 95% CI) |
|---------------------|-------------------------------|--|--|
| Nonbreeding | 11,030 | 3.0 (0.0–12.6) | 0.108% (0.000%–0.451%) |
| Annual (regional) | 11,030 | 3.1 (0.0–13.1) | 0.110% (0.000%–0.469%) |

Great black-backed gull

Breeding population estimates have been revised to use Method 2, as required under RFI 8avii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of great black-backed gull

Great black-backed gull are considered to have a high vulnerability to collision impacts (Table A15.33). A relatively low number of individuals were recorded during aerial surveys, and with no internationally or nationally designated sites for this species within mean max foraging range of the proposed development other than the NWIS cSPA. Great black-backed gull are also BoCCI Amber listed and IUCN Least Concern (Table 15.6 of the 2024 EIAR). They are therefore considered to have a medium conservation value (Table 15.5 of the 2024 EIAR). However, it is noted that recent research has recommended an increase in IUCN Red List criteria for this species from ‘Least Concern’ to ‘Vulnerable’ (Langlois Lopez *et al.*, 2023).

Great black-backed gull therefore have high vulnerability (Table 15.4 of the 2024 EIAR), and a medium conservation value (Table 15.5 of the 2024 EIAR) with an overall receptor sensitivity assessed as high based on the matrix approach in Table 15.6 of the 2024 EIAR.

Magnitude of impact

During the breeding bio-season two (2.1) great black-backed gull are predicted to be at risk of collision mortality. Based on a breeding bio-season regional population size of 2,685 individuals (Table A15.7) and a baseline mortality of 260 individuals per annum (based on an average mortality rate of 0.097; Table A15.8), the addition of two collision mortalities would represent a 0.799% increase in baseline mortality.

During the non-breeding bio-season 11 (11.3) great black-backed gull are predicted to be at risk of collision mortality. Based on a non-breeding bio-season regional population size of 53,406 individuals (Table A15.7) and a baseline mortality of 5,074 individuals per annum (based on an average mortality rate of 0.097; Table A15.8), the addition of 11 collision mortalities would represent a 0.218% increase in baseline mortality.

Across all bio-seasons, a total of 13 (13.4) great black-backed gull are predicted to be at risk of collision mortality. Based on the largest regional population of 53,406 individuals (Table A15.7) and a baseline mortality of 5,074 individuals per annum (based on an average mortality rate of 0.097; Table A15.8), the addition of 13 collision mortalities would represent a 0.259% increase in baseline mortality. Considering the biogeographic population of 235,000 individuals (Table A15.7) and a baseline mortality of 22,325 individuals per annum (based on an average mortality rate of 0.097; Table A15.8), the addition of 13 collision mortalities would represent a 0.059% increase in baseline mortality. The full range of impacts is presented in Table A15.37 below.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from collision risk would be low (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Project Option 1

Overall, it is predicted that the sensitivity of great black-backed gull for Project Option 1 is high and the magnitude of the impact is low. The high sensitivity and low magnitude of the impact on great black-backed gull results in a moderate effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the medium sensitivity and medium magnitude of the impact on great black-backed gull results in a moderate effect at worst, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.37 Predicted bio-season collision impacts on great black-backed gull from the proposed development (Project Option 1) during the operational phase (replaces Table 15.51 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Population size (individuals) | Estimated mortality (individuals) (+/- 95% CI) | Percentage increase in baseline mortality (+/- 95% CI) |
|------------------------------|-------------------------------|--|--|
| Breeding | 2,685 | 2.1 (0.0–12.4) | 0.799% (0.000%–4.781%) |
| Non-breeding | 53,406 | 11.3 (0.0–41.5) | 0.218% (0.000%–0.802%) |
| Annual (regional population) | 53,406 | 13.4 (0.0–53.9) | 0.259% (0.000%–1.042%) |
| Annual (biogeographic) | 235,000 | 13.4 (0.0–53.9) | 0.059% (0.000%–0.237%) |

Herring gull

Breeding population estimates have been revised to use Method 2, as required under RFI 8avii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of herring gull

Herring gull are considered to have a high vulnerability to collision impacts (Table A15.33). A high number of individuals were recorded during aerial surveys. Though there is connectivity with SPAs for which herring gull is a qualifying interest, including Ireland’s Eye SPA and Lambay Island SPA, there are also several non-designated colonies where birds originate from (e.g. Balbriggan Town). Herring gull are BoCCI Amber listed and IUCN Least Concern (Table 15.16 of the 2024 EIAR). Therefore, the conservation status is considered to be medium (Table 15.5 of the 2024 EIAR).

Herring gull therefore have high vulnerability (Table 15.4 of the 2024 EIAR), and a medium conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as high based on the matrix approach in Table 15.6 of the 2024 EIAR.

Magnitude of impact

During the breeding bio-season 16 (15.9) herring gull are predicted to be at risk of collision mortality. Based on a breeding bio-season regional population size of 26,459 individuals (Table A15.7) and a baseline mortality of 4,524 individuals per annum (based on an average mortality rate of 0.172; Table A15.8), the addition of 16 collision mortalities would represent a 0.349% increase in baseline mortality.

During the non-breeding bio-season 27 (26.5) herring gull are predicted to be at risk of collision mortality. Based on a non-breeding bio-season regional population size of 187,094 individuals (Table A15.7) and a baseline mortality of 31,993 individuals per annum (based on an average mortality rate of 0.172; Table A15.8), the addition of 27 collision mortalities would represent a 0.082% increase in baseline mortality.

Across all bio-seasons, a total of 42 (42.4) herring gull are predicted to be at risk of collision mortality. Based on the largest regional population of 187,094 individuals (Table A15.7) and a baseline mortality of 31,993 individuals per annum (based on an average mortality rate of 0.172; Table A15.8), the addition of 42 collision mortalities would represent a 0.131% increase in baseline mortality. Considering the biogeographic population of 1,098,000 individuals (Table A15.7) and a baseline mortality of 187,758 individuals per annum, the addition of 42 collision mortalities would represent a 0.022% increase in baseline mortality. The full range of results is presented in Table A15.38 below.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from collision risk would be low (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Project Option 1

Overall, it is predicted that the sensitivity of herring gull for Project Option 1 is high and the magnitude of the impact is low. The high sensitivity and low magnitude of the impact on herring gull results in a moderate effect, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR .

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the high sensitivity and low magnitude of the impact on herring gull results in a moderate effect at worst, which is not significant in EIA terms, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.38 Predicted bio-season collision impacts on herring gull from the proposed development (Project Option1) during the operational phase (replaces Table 15.52 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Population size (individuals) | Estimated mortality (individuals) (+/- 95% CI) | Percentage increase in baseline mortality (+/- 95% CI) |
|------------------------------|-------------------------------|--|--|
| Breeding | 26,459 | 15.9 (0.0–89.8) | 0.349% (0.000%–1.969%) |
| Non-breeding | 187,094 | 26.5 (0.9–101.8) | 0.082% (0.003%–0.316%) |
| Annual (regional population) | 187,094 | 42.4 (0.9–191.7) | 0.131% (0.003%–0.594%) |
| Annual (biogeographic) | 1,098,000 | 42.4 (0.9–191.7) | 0.022% (0.000%–0.101%) |

Lesser black-backed gull

Breeding population estimates have been revised to use Method 2, as required under RFI 8avii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of lesser black-backed gull

Lesser black-backed gull are considered to have a high vulnerability to collision impacts (Table A15.33). During surveys, a low number of individuals were recorded, though a relatively high proportion of these are expected to originate from the Lambay Island SPA, where lesser black-backed gull is a qualifying interest. Lesser black-backed gull are also BoCCI Amber listed and IUCN Least Concern (Table 15.16 of the 2024 EIAR). They are therefore considered to have a medium conservation value (Table 15.5 of the 2024 EIAR).

Lesser black-backed gull therefore have high vulnerability (Table 15.4 of the 2024 EIAR), and a medium conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as high based on the matrix approach in Table 15.6 of the 2024 EIAR.

Magnitude of impact

During the breeding bio-season one (1.0) lesser black-backed gull is predicted to be at risk of collision mortality. Based on a breeding bio-season regional population size of 75,470 individuals (Table A15.7) and a baseline mortality of 9,283 individuals per annum (based on an average mortality rate of 0.124; Table A15.8), the addition of one collision mortality would represent a 0.011% increase in baseline mortality.

During the spring migration bio-season zero (0.0) lesser black-backed gull is predicted to be at risk of collision mortality. Based on a spring migration bio-season regional population size of 171,500 individuals (Table A15.7) and a baseline mortality of 21,095 individuals per annum (based on an average mortality rate of 0.124; Table A15.8), the addition of zero collision mortality would represent a 0.000% increase in baseline mortality.

During the autumn migration bio-season zero (0.0) lesser black-backed gull is predicted to be at risk of collision mortality. Based on an autumn migration bio-season regional population size of 171,500 individuals (Table A15.7) and a baseline mortality of 21,095 individuals per annum (based on an average mortality rate of 0.124; Table A15.8), the addition of zero collision mortality would represent a 0.000% increase in baseline mortality.

During the migration-free winter migration bio-season, zero (0.0) lesser black-backed gull are predicted to be at risk of collision mortality. Based on a migration-free winter bio-season regional population size of 53,368 individuals (Table A15.7) and a baseline mortality of 6,564 individuals per annum (based on an average mortality rate of 0.124; Table A15.8), the addition of zero collision mortalities would represent a 0.000% increase in baseline mortality.

Across all bio-seasons, a total of one (1.0) lesser black-backed gull are predicted to be at risk of collision mortality. Based on the largest regional population of 171,500 individuals (Table A15.7) and a baseline mortality of 21,095 individuals per annum (based on an average mortality rate of 0.124; Table A15.8), the addition of one collision mortalities would represent a 0.005% increase in baseline mortality.

Considering the biogeographic population of 864,000 individuals (Table A15.7) and a baseline mortality of 106,272 individuals per annum, the addition of one collision mortalities would represent a 0.001% increase in baseline mortality. The full range of results is presented in Table A15.39 below.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from collision risk would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of lesser black-backed gull for Project Option 1 is high and the magnitude of the impact is negligible. The high sensitivity and negligible magnitude of the impact on lesser black-backed gull results in a not significant effect in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the high sensitivity and negligible magnitude of the impact on lesser black-backed gull results in a not significant effect at worst, based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.39 Predicted bio-season collision impacts on lesser black-backed gull from the proposed development (Project Option 1) during the operational phase (replaces Table 15.53 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Population size (individuals) | Estimated mortality (individuals) (+/- 95% CI) | Percentage increase in baseline mortality (+/- 95% CI) |
|------------------------------|-------------------------------|--|--|
| Autumn migration | 171,500 | 0.0 (0.0–0.0) | 0.000% (0.000%–0.000%) |
| Breeding | 75,470 | 1.0 (0.0–8.8) | 0.011% (0.000%–0.094%) |
| Migration-free winter | 53,368 | 0.0 (0.0–0.0) | 0.000% (0.000%–0.000%) |
| Spring migration | 171,500 | 0.0 (0.0–0.0) | 0.000% (0.000%–0.000%) |
| Annual (regional population) | 171,500 | 1.0 (0.0–8.8) | 0.005% (0.000%–0.041%) |
| Annual (biogeographic) | 864,000 | 1.0 (0.0–8.8) | 0.001% (0.000%–0.008%) |

Roseate tern

Roseate tern has been reassessed for CRM in response to RFI 8aiv. In the absence of generic flight height data of roseate tern from Jonston *et al.* (2014) data for common tern was used within the model as a precautionary approach. Breeding population estimates have also been revised to use Method 2, as required under RFI 8aviii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of roseate tern

Roseate tern are considered to have a low vulnerability to collision impacts (Table A15.33). During site-specific DAS surveys, a low number of individuals were recorded, though recorded birds are expected to almost exclusively originate from the Rockabill SPA, representing the only colony with breeding season connectivity to the proposed development where roseate tern is a qualifying interest (based on foraging ranges provided in Woodward *et al.*, (2019)). Roseate tern are also BoCCI Amber listed, IUCN Least concern and Birds Directive Annex 1 (Table 15.16 of the 2024 EIAR). Despite their relatively low conservation status, they are considered to have a high conservation value to reflect their high connectivity with the Rockabill SPA (Table 15.5 of the 2024 EIAR).

Roseate tern therefore have low vulnerability (Table 15.4 of the 2024 EIAR), and a high conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Magnitude of impact

During the breeding bio-season one (1.2) roseate tern is predicted to be at risk of collision mortality. Based on a breeding bio-season regional population size of 5,586 individuals (Table A15.7) and a baseline mortality of 966 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of less than one collision mortality would represent a 0.119% increase in baseline mortality.

During the spring migration bio-season zero (0.0) roseate tern are predicted to be at risk of collision mortality. Based on a spring migration bio-season regional population size of 6,375 individuals (Table A15.7) and a baseline mortality of 1,103 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of zero collision mortalities would represent a 0.000% increase in baseline mortality.

During the autumn migration bio-season zero (0.0) roseate tern are predicted to be at risk of collision mortality. Based on an autumn migration bio-season regional population size of 6,375 individuals (Table A15.7) and a baseline mortality of 1,103 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of zero collision mortalities would represent a 0.000% increase in baseline mortality.

Across all bio-seasons, a total of one (1.2) roseate tern is predicted to be at risk of collision mortality. Based on the largest regional population size of 6,375 individuals (Table A15.7) and a baseline mortality of 1,103 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of one collision mortalities would represent a 0.104% increase in baseline mortality. Considering the biogeographic population of 2,900 individuals (Table A15.7) and a baseline mortality of 502 individuals per annum, the addition of one collision mortalities would represent a 0.229% increase in baseline mortality. The full range of impacts is presented in Table A15.40 below.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from collision risk would be low (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of roseate tern for Project Option 1 is medium and the magnitude of the impact is negligible. The medium sensitivity and low magnitude of the impact on roseate tern results in a slight effect, which is not significant effect in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the medium sensitivity and low magnitude of the impact on roseate tern results in a slight effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.40 Predicted bio-season collision impacts on roseate tern from the proposed development (Project Option 1) during the operational phase (replaces Table 15.54 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Population size (individuals) | Estimated mortality (individuals) (+/- 95% CI) | Percentage increase in baseline mortality (+/- 95% CI) |
|------------------------------|-------------------------------|--|--|
| Autumn migration | 6,375 | 0.0 (0.0–0.0) | 0.000% (0.000%–0.000%) |
| Breeding | 5,586 | 1.2 (0.0–6.4) | 0.119% (0.000%–0.662%) |
| Spring migration | 6,375 | 0.0 (0.0–0.0) | 0.000% (0.000%–0.000%) |
| Annual (regional population) | 6,375 | 1.2 (0.0–6.4) | 0.104% (0.000%–0.580%) |
| Annual (Biogeographic)* | 2,900 | 1.2 (0.0–6.4) | 0.229 % (0.000%–1.275%) |

*In this case the biogeographic population is larger than the regional population due to the Irish population contribution being considerably larger than the UK biogeographic population estimate in Furness (2015).

Common tern

Breeding population estimates have been revised to use Method 2, as required under RFI 8avii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of common tern

Common tern are considered to have a low vulnerability to collision impacts (Table A15.33). During surveys, a low number of individuals were recorded, though recorded birds are expected to almost exclusively originate from the Rockabill SPA, representing the only SPA where common tern is a qualifying interest and has connectivity to the proposed development (based on foraging ranges provided in Woodward *et al.*, (2019). Common tern are also BoCCI Amber listed, IUCN Least Concern, and Birds Directive Annex 1 (Table 15.16 of the 2024 EIAR). Despite their relatively low conservation status, they are considered to have a high conservation value to reflect their high connectivity with the Rockabill SPA (Table 15.5 of the 2024 EIAR).

Common tern therefore have low vulnerability (Table 15.4 of the 2024 EIAR), and a high conservation value (Table 15.5 of the 2024 EIAR) with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Magnitude of impact

During the breeding bio-season, one (0.6) common tern is predicted to be at risk of collision mortality. Based on a breeding bio-season regional population size of 6,949 individuals (Table A15.7) and a baseline mortality of 1,201 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of one collision mortality would represent a 0.051% increase in baseline mortality.

During the spring migration bio-season zero (0.0) common tern are predicted to be at risk of collision mortality. Based on a spring migration bio-season regional population size of 74,000 individuals (Table A15.7) and a baseline mortality of 12,787 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of zero collision mortalities would represent a 0.000% increase in baseline mortality.

During the autumn migration bio-season zero (0.0) common tern are predicted to be at risk of collision mortality. Based on an autumn migration bio-season regional population size of 74,000 individuals (Table A15.7) and a baseline mortality of 12,787 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of zero collision mortalities would represent a 0.000% increase in baseline mortality.

Across all bio-seasons, a total one (0.6) common tern is predicted to be at risk of collision mortality. Based on the largest regional population of 74,000 individuals (Table A15.7) and a baseline mortality of 12,787 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of one collision mortalities would represent a 0.005% increase in baseline mortality. Considering the biogeographic population of 480,000 individuals (Table A15.7) and a baseline mortality of 82,944 individuals per annum, the addition of one collision mortalities would represent a 0.001% increase in baseline mortality. The full range of impacts is presented in Table A15.41 below.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from collision risk would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of common tern for Project Option 1 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on common tern

results in an imperceptible effect, which is not significant effect in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the medium sensitivity and negligible magnitude of the impact on common tern results in an imperceptible effect, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.41 Predicted bio-season collision impacts on common tern from the proposed development (Project Option 1) during the operational phase (replaces Table 15.55 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Population size (individuals) | Estimated mortality (individuals) (+/- 95% CI) | Percentage increase in baseline mortality (+/- 95% CI) |
|------------------------------|-------------------------------|--|--|
| Autumn migration | 74,000 | 0.0 (0.0–0.0) | 0.000% (0.000%–0.000%) |
| Breeding | 6,949 | 0.6 (0.0–4.0) | 0.051% (0.000%–0.336%) |
| Spring migration | 74,000 | 0.0 (0.0–0.0) | 0.000% (0.000%–0.000%) |
| Annual (regional population) | 74,000 | 0.6 (0.0–4.0) | 0.005% (0.000%–0.032%) |
| Annual (Biogeographic) | 480,000 | 0.6 (0.0–4.0) | 0.001% (0.000%–0.005%) |

Arctic tern

Breeding population estimates have been revised to use Method 2, as required under RFI 8avii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of Arctic tern

Arctic tern are considered to have a low vulnerability to collision impacts (Table A15.33). During surveys, a low number of individuals were recorded, though recorded individuals are expected to almost exclusively originate from the Rockabill SPA, representing the only SPA where Arctic tern is a qualifying interest and has connectivity to the proposed development (based on foraging ranges provided in Woodward *et al.*, (2019). Arctic tern are also BoCCI Amber listed, IUCN Least Concern and Birds Directive Annex 1 (Table 15.16 of the 2024 EIAR). Despite their relatively low conservation status, they are considered to have a high conservation value to reflect their high connectivity with the Rockabill SPA (Table 15.5 of the 2024 EIAR).

Arctic tern therefore have low vulnerability (Table 15.4 of the 2024 EIAR), and a high conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Magnitude of impact

During the breeding bio-season, less than one (0.3) Arctic tern is predicted to be at risk of collision mortality. Based on a breeding bio-season regional population size of 178 individuals (Table A15.7) and a baseline mortality of 30 individuals per annum (based on an average mortality rate of 0.163; Table A15.8), the addition of less than one collision mortality would represent a 0.862% increase in baseline mortality.

During the spring migration bio-season zero (0.0) Arctic tern are predicted to be at risk of collision mortality. Based on a spring migration bio-season regional population size of 72,231 individuals (Table A15.7) and a baseline mortality of 13,218 individuals per annum (based on an average mortality rate of 0.163; Table A15.8), the addition of zero collision mortalities would represent a 0.000% increase in baseline mortality.

During the autumn migration bio-season zero (0.0) Arctic tern are predicted to be at risk of collision mortality. Based on an autumn migration bio-season regional population size of 72,231 individuals (Table A15.7) and a baseline mortality of 13,218 individuals per annum (based on an average mortality rate of 0.163; Table A15.8), the addition of zero collision mortalities would represent a 0.000% increase in baseline mortality.

Across all bio-seasons, a total less than one (0.3) Arctic tern is predicted to be at risk of collision mortality. Based on the largest regional population of 72,231 individuals (Table A15.7) and a baseline mortality of 13,218 individuals per annum (based on an average mortality rate of 0.163; Table A15.8), the addition of less than one collision mortalities would represent a 0.002% increase in baseline mortality. Considering the biogeographic population of 628,000 individuals (Table A15.7) and a baseline mortality of 114,924 individuals per annum, the addition of less than one collision mortalities would represent a 0.000% increase in baseline mortality.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from collision risk would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Impacts from Project Option 1 are calculated to be equal to or less than those from Project Option 2. Therefore, the medium sensitivity and negligible magnitude of the impact on Arctic tern results in an imperceptible effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Overall, it is predicted that the sensitivity of Arctic tern for Project Option 2 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on Arctic tern results in an imperceptible effect, which is not significant effect in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.42 Predicted bio-season collision impacts on Arctic tern from the proposed development (Project Option 2) during the operational phase (replaces Table 15.56 of Chapter 15 in the 2024 EIAR)

| Bio-season (months) | Population size (individuals) | Estimated mortality (individuals) (+/- 95% CI) | Percentage increase in baseline mortality (+/- 95% CI) |
|------------------------------|-------------------------------|--|--|
| Autumn migration | 72,231 | 0.0 (0.0–0.0) | 0.000% (0.000%–0.000%) |
| Breeding | 178 | 0.3 (0.0–2.6) | 1.034% (0.000%–8.961%) |
| Spring migration | 72,231 | 0.0 (0.0–0.0) | 0.000% (0.000%–0.000%) |
| Annual (regional population) | 72,231 | 0.3 (0.0–2.6) | 0.003% (0.000%–0.022%) |
| Annual (biogeographic) | 628,000 | 0.3 (0.0–2.6) | 0.000% (0.000%–0.003%) |

Fulmar

The updated CRM assessment for Fulmar is presented in the Appendix A15.3: Offshore Ornithology Collision Risk Modelling Assessment). In addition, all impacts have been recalculated based on the abundance and density estimates for the refined PFI rather than the full array area.

Sensitivity of fulmar

Fulmar are considered to have a low vulnerability to collision impacts (Table A15.33). During surveys, a low number of individuals were recorded, and individuals are expected to originate from a wide range of both designated and non-designated colonies (with 23 colonies within 100km, an several hundred within foraging range of the proposed development). Fulmar are also BoCCI Green listed and IUCN Least Concern (Table 15.16 of the 2024 EIAR). They are, however, a qualifying interest of the NWIS cSPA therefore considered to have a conservation value of medium (Table 15.5 of the 2024 EIAR).

Fulmar therefore have low vulnerability (Table 15.4 of the 2024 EIAR), and a low conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as low based on the matrix approach in Table 15.6 of the 2024 EIAR. Despite this, they are screened in as a precautionary approach due to their designation at the NWIS cSPA within which the proposed development is located.

Magnitude of impact

Across the 41 months of DAS data collection, a total of 16 fulmar were recorded within the PFI, and of these only two were flying and are therefore considered relevant for potential collision impacts. Based on the CRM assessment (presented in the Appendix A15.3: Offshore Ornithology Collision Risk Modelling Assessment), a total of less than 0.1 (0.02) collision mortalities are predicted across all bio-seasons. Based on the very low magnitude of impact predicted, potential collision effects on fulmar are considered to be of a negligible magnitude across all bio-seasons.

This is further supported by available data, with fulmar considered to be at low risk of collision due to spending limited time at collision risk height (Garthe and Hüppop, 2004, Cook *et al.*, 2012, Fijn *et al.*, 2012, Krijgsveld, 2014, Leopold *et al.*, 2014, Harwood *et al.*, 2018). Based on modelling based on 29,168 vessel-based observations estimates that the proportion of fulmar flying at collision risk height (where the lower limit of the rotor-swept area is 20m above sea level) is 0.002 (95% CI 0.000–0.061; Johnston *et al.*, 2014).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from collision risk would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of fulmar for Project Option 1 is medium and the magnitude of the impact is negligible. The low sensitivity and negligible magnitude of the impact on fulmar results in an imperceptible effect, which is not significant effect in EIA terms based on the matrix approach Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the medium sensitivity and negligible magnitude of the impact on fulmar results in an imperceptible effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Manx shearwater

The updated CRM assessment for Manx Shearwater is presented in the Appendix A15.3: Offshore Ornithology Collision Risk Modelling Assessment). In addition, all impacts have been recalculated based on the abundance and density estimates for the refined PFI rather than the full array area.

Sensitivity of Manx shearwater

Manx shearwater are considered to have a low vulnerability to collision impacts (Table A15.33). As outlined in Section 15.5.2, Manx shearwater have a high conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

They are screened in as a precautionary approach due to their designation at the NWIS cSPA within which the proposed development is located.

Magnitude of impact

Based on the CRM assessment (presented in the Appendix A15.3: Offshore Ornithology Collision Risk Modelling Assessment), almost zero (0.0) collision mortalities are predicted. Based on the very low magnitude of impact predicted, potential collision effects on Manx shearwater are not considered further here, with a negligible magnitude predicted across all bio-seasons.

This is further supported by available data, with Manx shearwater considered to be at low risk of collision due to spending limited time at collision risk height (Garthe and Hüppop, 2004, King *et al.*, 2009, Cook *et al.*, 2012, Furness and Wade, 2012, Furness *et al.*, 2013, Bradbury *et al.*, 2014, Certain *et al.*, 2015). Modelling based on 6,957 vessel-based observations estimates that the percentage of Manx shearwater flying at collision risk height (where the lower limit of the rotor-swept area is 20m above sea level) is 0.04% (95% CI <0.01–10.1%; Cook *et al.*, 2012). Similarly, modelling by Johnston and Cook (2016) estimates the proportion of time Manx shearwater fly within the rotor-swept zone is 0.0 (95% CI 0.0–0.0) based on boat survey data, and 0.0 (95% CI 0.0–0.02) based on DAS data.

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from collision risk would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of Manx shearwater for Project Option 1 is medium and the magnitude of the impact is negligible. The low sensitivity and negligible magnitude of the impact on Manx shearwater results in an imperceptible effect, which is not significant effect in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the medium sensitivity and negligible magnitude of the impact on Manx shearwater results in an imperceptible effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Gannet

Gannet collision impacts are presented both with a 70% macro-avoidance correction applied and without any correction, in order to address the requirements of RFI 8cv. Breeding population estimates have also been revised to use Method 2, as required under RFI 8aviii. In addition, abundance and density estimates are now based on the refined PFI rather than the full array area.

Sensitivity of gannet

Gannet are considered to have a medium vulnerability to collision impacts (Table A15.33). As outlined in Section 15.5.2, gannet have a medium conservation value (Table 15.5 of the 2024 EIAR), with an overall receptor sensitivity assessed as medium based on the matrix approach in Table 15.6 of the 2024 EIAR.

Magnitude of impact

For the assessment of gannet, collisions have been reduced by 70% to account for macro-avoidance behaviour, which is advised by SNCBs in English projects (and Scottish projects in the non-breeding season). However, impacts unadjusted for macro-avoidance have also been calculated and presented in Table A15.43.

During the breeding bio-season, one (1.0) gannet is predicted to be at risk of collision mortality. Based on a breeding bio-season regional population size of 632,514 individuals (Table A15.7) and a baseline mortality of 118,280 individuals per annum (based on an average mortality rate of 0.187; Table A15.7), the addition of one collision mortality would represent a 0.001% increase in baseline mortality.

During the autumn migration bio-season less than one (0.1) gannet is predicted to be at risk of collision mortality. Based on an autumn migration bio-season regional population size of 535,183 individuals (Table A15.7) and a baseline mortality of 100,079 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of less than one collision mortality would represent a <0.001% increase in baseline mortality.

During the spring migration bio-season less than one (<0.1) gannet are predicted to be at risk of collision mortality. Based on a spring migration bio-season regional population size of 643,917 individuals (Table

A15.7) and a baseline mortality of 120,412 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of almost zero collision mortalities would represent a <0.001% increase in baseline mortality.

Across all bio-seasons, one (1.1) gannet is predicted to be at risk of collision mortality. Based on the largest regional population of 643,917 individuals (Table A15.7) and a baseline mortality of 120,412 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of four collision mortality would represent a 0.001% increase in baseline mortality. Considering the biogeographic population of 1,180,000 individuals (Table A15.7) and a baseline mortality of 214,760 individuals per annum, the addition of one collision mortality would represent a 0.001% increase in baseline mortality.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from collision risk would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of gannet for Project Option 1 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on gannet results in an imperceptible effect, which is not significant effect in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the medium sensitivity and negligible magnitude of the impact on gannet results in an imperceptible effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.43 Predicted bio-season collision impacts on northern gannet from the proposed development (Project Option 1) during the operational phase

| Bio-season (months) | Population size (individuals) | Estimated mortality (individuals) (+/- 95% CI) | Percentage increase in baseline mortality (+/- 95% CI) |
|--------------------------------|-------------------------------|--|--|
| With macro-avoidance | | | |
| Autumn migration | 535,183 | 0.1 (0.0–0.8) | 0.000% (0.000%–0.001%) |
| Breeding | 632,514 | 1.0 (0.0–4.6) | 0.001% (0.000%–0.004%) |
| Spring migration | 643,917 | 0.0 (0.0–0.1) | 0.000% (0.000%–0.000%) |
| Annual (regional population) | 643,917 | 1.1 (0.0–5.5) | 0.001% (0.000%–0.005%) |
| Annual (biogeographic) | 1,180,000 | 1.1 (0.0–5.5) | 0.001% (0.000%–0.003%) |
| Without macro-avoidance | | | |
| Autumn migration | 535,183 | 0.4 (0.0–2.7) | 0.000% (0.000%–0.003%) |
| Breeding | 632,514 | 3.3 (0.0–15.4) | 0.003% (0.000%–0.013%) |
| Spring migration | 643,917 | 0.0 (0.0–0.3) | 0.000% (0.000%–0.000%) |
| Annual (regional population) | 643,917 | 3.7 (0.0–18.5) | 0.003% (0.000%–0.015%) |

| Bio-season (months) | Population size (individuals) | Estimated mortality (individuals) (+/- 95% CI) | Percentage increase in baseline mortality (+/- 95% CI) |
|------------------------|-------------------------------|--|--|
| Annual (biogeographic) | 1,180,000 | 3.7 (0.0–18.5) | 0.002% (0.000%–0.008%) |

15.5.3.3 Impact 7: Combined collision risk and displacement risk (gannet)

In response to RFI 8cv gannet impacts have been presented both with and without a correction for macro-avoidance. Therefore, Section 15.3.3.3 of Chapter 15 of the 2024 has been updated and replaced in its entirety with the text herein.

For gannet, which has been assessed for both collision and displacement impacts in the operational phase, a combined assessment is needed to fully understand the magnitude of the impacts from the proposed development.

As outlined in Section 0, Project Option 1 is considered here as the option with the greatest potential for impacts on gannet.

Sensitivity of gannet

As outlined for Impact 5 and Impact 6, gannet have a medium vulnerability to both collision and displacement impacts, with an overall sensitivity of medium.

Magnitude of impact

Results from collision and displacement, and the total combined impacts for gannet in the operational phase for the proposed development alone are presented in Table A15.44 below. Results are presented based on the main approach displacement values, with a range presented for gannet in brackets as carried out within Section 15.5.2.

Table A15.44 Gannet combined displacement and collision impacts (replaces Table 15.57 in Chapter 15 of the 2024 EIAR).

| Bio-season (months) | Estimated mortality (individuals) | | Percentage increase in baseline mortality | |
|--------------------------------|-----------------------------------|--------------------------------|---|--------------------------------|
| | 70% displacement, 1% mortality | 70% displacement, 3% mortality | 70% displacement, 1% mortality | 70% displacement, 3% mortality |
| With macro-avoidance | | | | |
| Autumn migration | 1.0 (0.5–2.3) | 2.9 (1.4–5.3) | 0.001% (0.001%–0.002%) | 0.003% (0.001%–0.005%) |
| Breeding | 2.9 (0.9–7.7) | 6.7 (2.7–14.0) | 0.002% (0.001%–0.007%) | 0.006% (0.002%–0.012%) |
| Spring migration | 0.1 (0.0–0.2) | 0.2 (0.0–0.5) | 0.000% (0.000%–0.000%) | 0.000% (0.000%–0.000%) |
| Annual (regional population) | 4.0 (1.4–10.2) | 9.8 (4.1–19.7) | 0.003% (0.001%–0.009%) | 0.008% (0.003%–0.016%) |
| Annual (Biogeographic) | 4.0 (1.4–10.2) | 9.8 (4.1–19.7) | 0.002% (0.001%–0.005%) | 0.004% (0.002%–0.009%) |
| Without macro-avoidance | | | | |
| Autumn migration | 1.3 (0.5–4.2) | 3.2 (1.4–7.2) | 0.001% (0.001%–0.004%) | 0.003% (0.001%–0.007%) |

| Bio-season (months) | Estimated mortality (individuals) | | Percentage increase in baseline mortality | |
|------------------------------|-----------------------------------|--------------------------------|---|--------------------------------|
| | 70% displacement, 1% mortality | 70% displacement, 3% mortality | 70% displacement, 1% mortality | 70% displacement, 3% mortality |
| Breeding | 5.2 (0.9–18.5) | 9.0 (2.7–24.8) | 0.004% (0.001%–0.016%) | 0.008% (0.002%–0.021%) |
| Spring migration | 0.1 (0.0–0.4) | 0.2 (0.0–0.7) | 0.000% (0.000%–0.000%) | 0.000% (0.000%–0.001%) |
| Annual (regional population) | 6.6 (1.4–23.2) | 12.4 (4.1–32.7) | 0.006% (0.001%–0.019%) | 0.010% (0.003%–0.027%) |
| Annual (Biogeographic) | 6.6 (1.4–23.2) | 12.4 (4.1–32.7) | 0.003% (0.001%–0.011%) | 0.006% (0.002%–0.015%) |

One (1.1) collision mortality is predicted as a result of the proposed development, and three (2.9) displacement mortalities. The total combined annual impact is therefore four (4.0).

Based on the largest regional population of 643,917 individuals (Table A15.7), and a baseline mortality of 120,412 individuals per annum (based on an average mortality of 0.182; Table A15.7), the addition of four mortalities would represent a 0.003% increase in baseline mortality. When using the upper displacement values, this impact results in a 0.008% increase in baseline mortality. Considering the biogeographic population of 1,180,000 individuals and a baseline mortality of 214,760 individuals per annum, the addition of six mortalities would represent a 0.002% increase in baseline mortality. When using the upper displacement values, this impact results in a 0.004% increase in baseline mortality.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from combined collision and displacement impacts would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of gannet for Project Option 1 is medium and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on gannet results in an imperceptible effect, which is not significant effect in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the medium sensitivity and negligible magnitude of the impact on gannet results in an imperceptible effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

15.5.3.4 Impact 8: Migratory collision risk

This section has been updated to replace section 15.5.3.4 of the 2024 EIAR in its entirety in response to the RFI 8aiv. The Developer has undertaken additional VP surveys, and collected considerable PAM data on Rockbill. These are discussed below.

In addition, the Developer has re-run the migratory CRM modelling utilising an Irish-specific modelling approach in collaboration with other Irish Sea ORE applicants, and has undertaken further data collection on

migratory birds to inform species inclusion which is discussed in a new section in this report. Tables and analyses have been updated accordingly to account for the updated modelling. Full details on the approach are presented within Appendix A15.4: Offshore Ornithology Migratory Collision Risk Modelling: Irish East Coast Phase One Offshore Wind Projects Cumulative Assessment.

In addition to the species assessed under Impact 6, there is also potential collision risk to migratory species which may pass through the array area during autumn and spring migrations.

An assessment of the collision risk to migratory birds has been carried out for the proposed development with detailed methods and results presented in Appendix A15.4.

To model the movements of migratory birds within the Proposed Development array area, a modified version of the Marine Scotland Avian Migration Collision Risk Model Shiny Application, hereafter referred to as the mCRM tool (HiDef Aerial Surveying Ltd., 2024), was employed because the tool was originally designed for OWFs in British waters, and with the use of UK populations. The mCRM tool was adapted to use Irish-specific flight lines and population data, avoiding the need to apportion UK populations to the Irish Sea and allowing a more accurate, Ireland-focused assessment of bird movements. By orienting the model around flights into and out of Ireland, movements of birds between the UK and Ireland are already reflected in Irish population estimates, removing the need to estimate UK overflight. Because the coastal and estuarine species considered are unlikely to bypass extensive suitable habitat along the Irish east coast, where several SPAs support these migrants, and because the Phase One wind farm areas lie close inshore, the likelihood of UK birds passing through the development sites without being part of the Irish population is very low. Modelling was undertaken for the Proposed Development only on the Project Option 1, which has the greatest potential for impacts on migratory birds due to the increased number of turbines. Impacts from the Project Option 2 can therefore be assumed to be of equal or lesser magnitude.

The screening of migratory species initially considered all species that are presented in the latest version of the mCRM tool (v1.0.0), including 70 migratory bird species. Of these, 27 were screened out due to a lack of potential connectivity with the Proposed Development (and other Irish East Coast Phase One Offshore Wind Farm Projects). For full justifications on the screening out of these species, please see Appendix A15.4.

Defined migratory seasons and relevant populations are presented within Appendix A15.4. The populations used in the mCRM tool are primarily drawn from Burke *et al.* (2018). The Irish populations were considered the most appropriate for this assessment because the Phase One developments are located relatively close inshore to Ireland, within the Irish Sea. It is highly unlikely that significant migration through the development area would involve birds other than those contributing to the Irish population. This aligns with EIA requirements to assess impacts on populations relevant to Ireland’s jurisdiction. Where a species does not have a population defined by Burke *et al.*, (2018), populations have been sourced from Irish Wetland Bird Survey data, or from species specific bespoke monitoring (for example for hen harrier and corncrake). For the remaining species for which an Irish population could not be derived (merlin, snipe and short-eared owl) the approach adopted for defining Irish population sizes by Codling Offshore Wind Farm in their 2024 application has been implemented (Codling Wind Park Limited, 2024). This approach defines a precautionary proportion of the UK population which may pass through Irish waters and uses this to inform the migratory CRM. In the case of the three species, 50% of the UK population was used. Table A15.45 below presents the migratory seasons and migratory populations used within the assessment.

Table A15.45 Migratory periods and Irish populations of migratory species screened in for assessment

| Species | Pre-breeding migration | Post-breeding migration | Other migration period | Migratory Irish population |
|------------------------------------|------------------------|-------------------------|------------------------|----------------------------|
| Bar-tailed godwit | Mar - Apr | Jul - Oct | NA | 16,530 |
| Black-tailed godwit | Mar - May | Jun - Oct | NA | 19,800 |
| Canadian light-bellied brent goose | Mar - May | Aug - Oct | NA | 35,150 |
| Corncrake | Apr - May | Jul - Aug | NA | 436 |
| Common scoter | Apr - May | Jun - Oct | NA | 7,500 |

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| Species | Pre-breeding migration | Post-breeding migration | Other migration period | Migratory Irish population |
|-------------------------------|------------------------|-------------------------|------------------------|----------------------------|
| Curlew | Mar - May | Jun - Oct | NA | 35,240 |
| Dunlin | Mar - May | Jun - Oct | NA | 45,760 |
| Eider | Mar - Apr | Oct - Nov | NA | 5,660 |
| Golden plover | Feb - May | Jul - Oct | NA | 92,060 |
| Goldeneye | Feb - May | Aug - Dec | NA | 3,820 |
| Great crested grebe | Mar - Jun | Jul - Nov | Feb - Mar | 2,930 |
| Great-northern diver | Dec - Jun | Aug - Nov | NA | 2,240 |
| Greenland white-fronted goose | Mar - Apr | Sep - Nov | NA | 9,590 |
| Greenshank | Mar - Jun | Aug - Nov | NA | 1,320 |
| Grey plover | Mar - May | Jul - Sep | NA | 2,940 |
| Hen harrier | Mar - May | Sep - Nov | NA | 222 |
| Knot | Feb - May | Jun - Oct | NA | 16,270 |
| Lapwing | Jan - May | Oct - Nov | NA | 84,690 |
| Long-tailed duck | Mar - May | Sep - Oct | NA | 38 |
| Mallard | Apr - Jun | Sep - Oct | Jan - Mar | 28,230 |
| Merlin | Mar - May | Aug - Nov | NA | 4,128 |
| Oystercatcher | Jan - Mar | Jul - Nov | NA | 60,540 |
| Pintail | Mar - May | Aug - Nov | NA | 1,570 |
| Pochard | Mar - May | Aug - Nov | NA | 11,150 |
| Purple sandpiper | Mar - May | Jul - Nov | NA | 660 |
| Red-breasted merganser | Apr - Jul | Aug - Nov | NA | 2,430 |
| Redshank | Mar - May | Jul - Sep | NA | 23,800 |
| Red-throated diver | Feb - Jun | Jul - Sep | NA | 770 |
| Ringed plover | Mar - May | Aug - Oct | NA | 11,660 |
| Ruff | Mar - May | Jul - Nov | NA | 39 |
| Sanderling | Apr - Jun | Jul - Oct | NA | 8,420 |
| Scaup | Feb - May | Sep - Nov | NA | 2,485 |
| Shelduck | Jan - Feb | Jun - Jul | Aug - Dec | 10,160 |
| Short-eared owl | Mar - May | Jul - Oct | NA | 7,440 |
| Shoveler | Mar - Jun | Jul - Aug | Sep - Dec | 2,240 |

| Species | Pre-breeding migration | Post-breeding migration | Other migration period | Migratory Irish population |
|-----------------|------------------------|-------------------------|------------------------|----------------------------|
| Slavonian grebe | Feb - Apr | Aug - Oct | NA | 42 |
| Snipe | Mar - May | Aug - Oct | Oct - Dec | 3,052,500 |
| Teal | Feb - May | Jul - Dec | NA | 35,740 |
| Tufted duck | Apr - Jun | Sep - Oct | NA | 27,470 |
| Turnstone | Jan - Jun | Jul - Aug | NA | 9,480 |
| Whimbrel | Apr - Jun | Jun - Oct | NA | 53 |
| Whooper swan | Feb - Apr | Sep - Nov | NA | 15,370 |
| Wigeon | Mar - Apr | Aug - Nov | NA | 55,730 |

Vantage-point surveys were undertaken prior to submission, with full methods and results provided in the Technical Baseline. These data informed the selection of species included in the mCRM, with the most frequently recorded being light-bellied brent goose, common scoter, golden plover, oystercatcher, turnstone and dunlin. Peak migration activity during these surveys occurred between September and November 2019, with an additional peak in March 2020.

The Developer has since supplemented this with further data collection, including vantage-point surveys at two mainland locations and on Rockabill Island between September and December 2025. Much like the pre-submission surveys, this revealed a far higher number of migratory birds utilising the inshore areas past the mainland locations than the offshore waters past Rockabill Island. Of the species screened out of mCRM assessment on the basis of low connectivity between migratory populations and the project, only velvet scoter was recorded during VP surveys. A total of nine velvet scoter across three occasions, however all individuals were sighted from a mainland location, often observed foraging in the area. These records are conducive with birds migrating along an inshore flyway and stopping to forage along the way, indicating poor connectivity with the proposed development and supporting the decision to screen them out of mCRM assessment. Commonly recorded species from the surveys include common scoter, meadow pipit, common tern and barn swallow. Common scoter were assessed using the mCRM tool, however, the other species cannot be assessed using the mCRM tool and combined with their low flight heights, the decision not to pursue assessment is appropriate.

PAM was also deployed on Rockabill Island over the same period to detect migrants moving through when observers were not present. Of the species screened out of mCRM assessment on the basis of low connectivity between migratory populations and the project, only dotterel was recorded by PAM. Only a single dotterel was recorded on one occasion; considering the scarcity of dotterel sightings in Ireland this record is consistent with a vagrant bird and likely does not reflect a regular passage of the species in proximity to the proposed project area, supporting the exclusion of the species from mCRM assessment. Commonly recorded species from the PAM include curlew, oystercatcher, robin, redwing and turnstone. Curlew, turnstone and oystercatcher were assessed using the mCRM tool, however, the other species cannot be assessed using the mCRM tool and combined with their low flight heights, the decision not to pursue assessment is appropriate.

Species recorded by the VP surveys and PAM that are designated in nearby SPAs include many species designated within the NWIS cSPA, with the exceptions being black-headed gull, puffin and little tern. However, these species were either almost exclusively recorded from mainland survey locations or observed at very low frequencies, negating the need for assessment with mCRM for many of the species.

Both the vantage-point and PAM datasets confirm that all relevant species were included in the mCRM. Where large numbers of migrants were recorded, these observations were cross-checked against the mCRM assumptions to ensure that the assumed number of flightpaths through the array remained suitably precautionary.

Although migrants were regularly detected offshore at Rockabill, numbers were generally low. Overall, the surveys recorded far higher numbers of migrants travelling north–south along the east coast of Ireland than offshore around Rockabill.

Sensitivity of migratory birds

The sensitivity of migratory non-seabird species is less well studied in the offshore environment because these species use offshore areas only during migration rather than on a daily basis, meaning their risk of collision is considerably lower. Therefore, vulnerability to collisions is considered to be generally low, with most migrations occurring on a broad front (i.e., birds flying across a wide area as opposed to channelling through a narrow area) and either above (at altitude) or below (close to the sea surface) rotor height.

The recoverability of migratory bird populations may vary considerably, with some species (e.g. dunlin) having a more favourable conservation status than some larger species with lower reproductive rates (e.g. Eurasian curlew).

Though sensitivity is considered to be low, the sensitivity of all migratory birds is assessed as medium in this EIAR as a precautionary approach.

Magnitude of impact

Following the estimated collision risk to each migratory species being determined (Table A15.46) a range of zero predicted mortalities per annum (e.g. for ruff) to a maximum 9.7 (snipe) predicted mortalities per annum were estimated for the Proposed Development. However, when considering the level of impact relative to the baseline mortality rate for each of these species, all were between 0.000% and 0.031%. This level of impact on an annual basis for all species is considered to be of negligible magnitude at most. Therefore, it can be concluded, based on the evidence available, that the proposed development will have an impact of negligible magnitude on migratory birds passing either north-south or east-west on their annual migrations (Table 15.7 of the 2024 EIAR).

Significance of the effect

Overall, it is predicted that the sensitivity of migratory birds for Project Option 1 and Project Option 2 is medium at worst and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on migratory birds results in an imperceptible effect at worst, which is not significant effect in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.46 Summary of migratory collision risk assessment on migrant waterbirds from the proposed development

| Species | Irish Population | Adult baseline mortality rate | Irish population baseline mortality | Annual collision rate (proposed development) | Population baseline mortality rate increase (%) |
|------------------------------------|------------------|-------------------------------|-------------------------------------|--|---|
| Bar-tailed godwit | 16,530 | 0.29 | 4,711 | 0.05 | 0.001 |
| Black-tailed godwit | 19,800 | 0.06 | 1,188 | 0.07 | 0.006 |
| Canadian light-bellied brent goose | 35,150 | 0.10 | 3,515 | 0.06 | 0.002 |
| Corncrake | 436 | 0.71 | 311 | 0.01 | 0.003 |
| Common scoter | 7,500 | 0.22 | 1,628 | 0.19 | 0.012 |
| Curlew | 35,240 | 0.10 | 3,559 | 0.15 | 0.004 |
| Dunlin | 45,760 | 0.26 | 11,898 | 0.14 | 0.001 |
| Eider | 5,660 | 0.08 | 475 | 0.10 | 0.021 |
| Golden plover | 92,060 | 0.27 | 24,856 | 0.26 | 0.001 |
| Goldeneye | 3,820 | 0.23 | 871 | 0.22 | 0.025 |
| Great crested grebe | 2,930 | 0.28 | 806 | 0.10 | 0.012 |
| Great northern diver | 2,240 | 0.16 | 358 | 0.01 | 0.003 |
| Greenland white-fronted goose | 9,590 | 0.28 | 2,647 | 0.04 | 0.001 |
| Greenshank | 1,320 | 0.26 | 343 | 0.01 | 0.002 |
| Grey plover | 2,940 | 0.14 | 412 | 0.01 | 0.003 |
| Hen harrier | 222 | 0.19 | 42 | 0.01 | 0.014 |
| Knot | 16,270 | 0.16 | 2,587 | 0.05 | 0.002 |
| Lapwing | 84,690 | 0.30 | 24,984 | 0.34 | 0.001 |

| Species | Irish Population | Adult baseline mortality rate | Irish population baseline mortality | Annual collision rate (proposed development) | Population baseline mortality rate increase (%) |
|------------------------|------------------|-------------------------------|-------------------------------------|--|---|
| Long-tailed duck | 38 | 0.28 | 11 | 0.00 | 0.019 |
| Mallard | 28,230 | 0.37 | 10,530 | 1.80 | 0.017 |
| Merlin | 4,128 | 0.38 | 1,569 | 0.17 | 0.011 |
| Oystercatcher | 60,540 | 0.12 | 7,265 | 0.24 | 0.003 |
| Pintail | 1,570 | 0.34 | 529 | 0.08 | 0.016 |
| Pochard | 11,150 | 0.35 | 3,903 | 0.78 | 0.020 |
| Purple sandpiper | 660 | 0.21 | 135 | 0.00 | 0.001 |
| Red-breasted merganser | 2,430 | 0.18 | 437 | 0.14 | 0.031 |
| Redshank | 23,800 | 0.26 | 6,188 | 0.08 | 0.001 |
| Red-throated diver | 770 | 0.16 | 123 | 0.00 | 0.003 |
| Ringed plover | 11,660 | 0.23 | 2,658 | 0.03 | 0.001 |
| Ruff | 39 | 0.48 | 19 | 0.00 | 0.000 |
| Sanderling | 8,420 | 0.17 | 1,431 | 0.00 | 0.000 |
| Scaup | 2,485 | 0.52 | 1,292 | 0.13 | 0.010 |
| Shelduck | 10,160 | 0.11 | 1,158 | 0.29 | 0.025 |
| Short-eared owl | 7,440 | 0.31 | 2,306 | 0.16 | 0.007 |
| Shoveler | 2,240 | 0.42 | 941 | 0.13 | 0.014 |
| Slavonian grebe | 42 | 0.18 | 8 | 0.00 | 0.026 |
| Snipe | 3,052,500 | 0.52 | 1,587,300 | 9.71 | 0.001 |
| Teal | 35,740 | 0.47 | 16,798 | 2.41 | 0.014 |

| Species | Irish Population | Adult baseline mortality rate | Irish population baseline mortality | Annual collision rate (proposed development) | Population baseline mortality rate increase (%) |
|--------------|------------------|-------------------------------|-------------------------------------|--|---|
| Tufted duck | 27,470 | 0.29 | 7,966 | 1.38 | 0.017 |
| Turnstone | 9,480 | 0.14 | 1,327 | 0.04 | 0.003 |
| Whimbrel | 53 | 0.11 | 6 | 0.00 | 0.000 |
| Whooper swan | 15,370 | 0.20 | 3,059 | 0.00 | 0.000 |
| Wigeon | 55,730 | 0.47 | 26,193 | 2.79 | 0.011 |

15.5.3.5 Impact 9: Indirect impacts due to impacts on prey

There are no changes to this section. Refer to Section 15.5.3.5 of Chapter 15 in the 2024 EIAR.

15.5.3.6 Impact 10: Impacts arising from artificial light

There are no changes to this section. Refer to Section 15.5.3.6 of Chapter 15 in the 2024 EIAR.

15.5.4 Decommissioning

There are no changes to this section. Refer to Section 15.5.4 of Chapter 15 in the 2024 EIAR.

15.5.4.1 Impact 11: Disturbance and displacement (PFI and ECC)

There are no changes to this section. Refer to Section 15.5.4.1 of Chapter 15 in the 2024 EIAR.

15.5.4.2 Impact 12: Indirect impacts due to impacts on prey

There are no changes to this section. Refer to Section 15.5.4.2 of Chapter 15 in the 2024 EIAR.

15.5.4.3 Impact 13: Impacts due to accidental pollution

There are no changes to this section. Refer to Section 15.5.4.3 of Chapter 15 in the 2024 EIAR.

15.5.4.4 Impact 14: Impacts arising from artificial light

There are no changes to this section. Refer to Section 15.5.4.4 of Chapter 15 in the 2024 EIAR.

15.6 Mitigation and Monitoring Measures

15.6.1 Mitigation

There are no changes to this section. Refer to Section 15.6.1 of Chapter 15 in the 2024 EIAR.

15.6.2 Monitoring

There are no changes to this section. Refer to Section 15.6.2 of Chapter 15 in the 2024 EIAR.

15.7 Residual Effects

This section has been updated in its entirety to reflect the conclusions of the revised assessments undertaken in direct response to the RFI. The updated ornithology assessment now incorporates the introduction of the PFI, the updated NWIS DAS dataset, and methodological updates arising from other RFI sections. See Section 15.5 for details of the revised assessments.

This section presents the residual effects of the proposed development once the mitigation outlined in Section 15.6 have been applied.

The impacts presented in Section 15.5 are assessed following embedded mitigation for the proposed development (as outlined in Section 15.6), and therefore conclusions from this section are considered to be the residual effects. The exception to this is Impact 1 in relation to vessel activity in the ECC. With the vessel mitigation for the proposed development (as outlined in Section 15.6), the magnitude of this impact will be substantially reduced compared to those assessed in Section 15.5.2.1. Notably for all species except common scoter, red-throated diver and great northern diver, this impact has already been assessed as imperceptible which is the lowest possible significance. For common scoter, red-throated diver and great northern diver the impact was assessed as not-significant, though for all three species the magnitude was assessed as negligible with the slightly higher significance rating driven by their high sensitivity. Therefore, though the magnitude of impact will be reduced, its overall classification cannot be less than negligible, so the overall significance will remain the same.

The residual effects of the project options once mitigation has been applied are summarised in Table A15.47.

Table A15.47 Residual effects relating to offshore and intertidal ornithology

| Potential impact | Species | Likely significant effect (pre-mitigation) – Project Option 1 | Likely significant effect (pre-mitigation) – Project Option 2 | Residual effect – Project Option 1 | Residual effect – Project Option 2 |
|---|-------------------------------------|---|---|------------------------------------|------------------------------------|
| Construction | | | | | |
| Impact 1: Disturbance and displacement | Common scoter | Not significant | Not significant | Not significant | Not significant |
| | Guillemot | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Razorbill | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Puffin | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Red-throated diver | Not significant | Not significant | Not significant | Not significant |
| | Great northern diver | Not significant | Not significant | Not significant | Not significant |
| | Manx shearwater | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Gannet | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Kittiwake | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Intertidal ornithological receptors | Not significant | Not significant | Not significant | Not significant |
| Impact 2: Indirect impacts due to impacts on prey | Common scoter | Moderate | Moderate | Moderate | Moderate |
| | Guillemot | Slight | Slight | Slight | Slight |
| | Razorbill | Slight | Slight | Slight | Slight |
| | Puffin | Slight | Slight | Slight | Slight |
| | Red-throated diver | Moderate | Moderate | Moderate | Moderate |
| | Great northern diver | Moderate | Moderate | Moderate | Moderate |
| | Manx shearwater | Moderate | Moderate | Moderate | Moderate |
| | Gannet | Slight | Slight | Slight | Slight |
| | Kittiwake | Moderate | Moderate | Moderate | Moderate |
| | Black-headed gull | Slight | Slight | Slight | Slight |
| | Common gull | Slight | Slight | Slight | Slight |
| | Great black-backed gull | Moderate | Moderate | Moderate | Moderate |
| | Herring gull | Moderate | Moderate | Moderate | Moderate |
| | Lesser black-backed gull | Slight | Slight | Slight | Slight |
| Roseate tern | Moderate | Moderate | Moderate | Moderate | |

| Potential impact | Species | Likely significant effect (pre-mitigation) – Project Option 1 | Likely significant effect (pre-mitigation) – Project Option 2 | Residual effect – Project Option 1 | Residual effect – Project Option 2 |
|--|------------------------------|---|---|------------------------------------|------------------------------------|
| | Common tern | Moderate | Moderate | Moderate | Moderate |
| | Arctic tern | Moderate | Moderate | Moderate | Moderate |
| | Fulmar | Slight | Slight | Slight | Slight |
| Impact 3: Indirect impacts due to accidental pollution | All ornithological receptors | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| Impact 4: Impacts arising from artificial light | All ornithological receptors | Not significant | Not significant | Not significant | Not significant |
| Operation | | | | | |
| Impact 5: Disturbance and displacement (PFI) | Guillemot | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Razorbill | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Puffin | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Manx shearwater | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Gannet | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Kittiwake | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| Impact 6: Collision risk | Kittiwake | Not significant | Not significant | Not significant | Not significant |
| | Black-headed gull | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Common gull | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Great black-backed gull | Moderate | Moderate | Moderate | Moderate |
| | Herring gull | Moderate | Moderate | Moderate | Moderate |
| | Lesser black-backed gull | Not significant | Not significant | Not significant | Not significant |
| | Roseate tern | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Common tern | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Arctic tern | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Fulmar | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Manx shearwater | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| | Gannet | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| Impact 7: Combined collision risk | Gannet | Imperceptible | Imperceptible | Imperceptible | Imperceptible |

| Potential impact | Species | Likely significant effect (pre-mitigation) – Project Option 1 | Likely significant effect (pre-mitigation) – Project Option 2 | Residual effect – Project Option 1 | Residual effect – Project Option 2 |
|---|------------------------------|---|---|------------------------------------|------------------------------------|
| and displacement risk (gannet) | | | | | |
| Impact 8: Migratory collision risk | Migratory birds | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| Impact 9: Indirect impacts due to impacts on prey | All ornithological receptors | Equal to or lower than Impact 2 | Equal to or lower than Impact 2 | Equal to or lower than Impact 2 | Equal to or lower than Impact 2 |
| Impact 10: Impacts arising from artificial light | All ornithological receptors | Imperceptible | Imperceptible | Imperceptible | Imperceptible |
| Decommissioning | | | | | |
| Impact 11: Disturbance and displacement (PFI and ECC) | All ornithological receptors | Equal to or lower than Impact 1 | Equal to or lower than Impact 1 | Equal to or lower than Impact 1 | Equal to or lower than Impact 1 |
| Impact 12: Indirect impacts due to impacts on prey | All ornithological receptors | Equal to or lower than Impact 2 | Equal to or lower than Impact 2 | Equal to or lower than Impact 2 | Equal to or lower than Impact 2 |
| Impact 13: Indirect impacts due to accidental pollution | All ornithological receptors | Equal to or lower than Impact 3 | Equal to or lower than Impact 3 | Equal to or lower than Impact 3 | Equal to or lower than Impact 3 |
| Impact 14: Impacts arising from artificial light | All ornithological receptors | Equal to or lower than Impact 4 | Equal to or lower than Impact 4 | Equal to or lower than Impact 4 | Equal to or lower than Impact 4 |

15.8 Transboundary Effects

This section has been updated to provide consideration of Isle of Man sites in response to the RFI 18 stating: “The Board notes that the observation received by the Territorial Sea Committee on behalf of the Isle of Man, raises, inter alia, concerns in relation to the lack of consideration of designated Manx sites, with potential for transboundary impacts in particular in relation to birds, fish/shellfish, and marine mammals. The applicant is requested to address the Isle of Man observation.”

Section 15.8.1 is now included in response to RFI Section 18 and is additional to that presented within the 2024 EIAR.

However, there are no other changes required to this section. Refer to Section 15.8 of Chapter 15 in the 2024 EIAR.

15.8.1 Potential impacts on the Isle of Man

It is acknowledged that designated sites on the Isle of Man have not been specifically assessed within the EIAR or NIS for the Proposed Development. However, seabird populations from the Isle of Man were included within the regional population assessments presented in this EIAR, ensuring that Isle of Man birds have been considered in a broader regional context.

Potential impacts on designated sites on the Isle of Man are predicted to be sufficiently small that any effects would be of negligible magnitude. While detailed apportionment of impacts to Isle of Man populations or designated sites has not been undertaken, the relatively small population sizes and the considerable distance from the project mean that any apportionment would be minimal.

During the breeding season, Appendix A15.8: Offshore and Intertidal Ornithology Apportioning provides apportionment details for sites within connectivity range. For Isle of Man sites, contributions are negligible. For scoped-in receptors with breeding season connectivity to the Isle of Man, the maximum apportionment to any site is:

- Manx Shearwater: 0.59% (Calf of Man)
- Lesser Black-backed Gull: 0.23% (Calf of Man)
- Herring Gull: 0.20% (Calf of Man)
- Kittiwake: 0.87% (Port St Mary – Sound)
- Guillemot: 0.24% (Port St Mary – Sound)
- Razorbill: 0.23% (Port St Mary – Sound)
- Puffin: 0.05% (Glen Maye – Peel)

Based on these figures, the highest apportionment to all species is less than 1% of the total impact. This results in only fractions of a single mortality being attributed to Isle of Man colonies, as impacts are concentrated on the much larger Irish colonies with substantially greater connectivity.

During the non-breeding season, birds range far beyond their breeding colonies, so connectivity extends well beyond the mean maximum foraging ranges typically used to assess breeding-season connectivity. As outlined in Appendix 15.10: Offshore and Intertidal Ornithology Apportioning, non-breeding season apportionment reflects the colony's proportional contribution to the wider regional non-breeding population.

On the Isle of Man, colonies are relatively small, meaning their contribution is negligible. For example, the total kittiwake population on the Isle of Man is approximately 1,370 individuals (Burnell, *et al.*, 2023). In contrast, the smallest regional non-breeding kittiwake population (during the pre-breeding migration period) is 713,137 individuals (Appendix A15.1 Offshore and Intertidal Ornithology Technical Baseline). This equates to just 0.19% of the regional total. Given this extremely small proportion, any potential impact attributable to Isle of Man birds would be biologically insignificant and effectively imperceptible. Therefore, the project will have no meaningful impact on the Isle of Man population.

Given the very low predicted impact from the Proposed Development alone on Isle of Man colonies, there is no realistic prospect of any material contribution of the Proposed Development to a cumulative effect on Isle of Man sites. Therefore, no further consideration is considered necessary.

15.9 Cumulative Effects

In response to RFI 5, the Cumulative Effects section has been fully updated using the most current publicly available impact information. This has required a complete update of the cumulative ornithology assessment, which now incorporates the revised project-alone assessment following the introduction of the PFI, the updated NWIS DAS dataset, and methodological updates arising from other RFI sections. In addition, impacts split by bio-season have been provided as requested in RFI 8di.

In addition, '*Cumulative Impact 5: Migratory collision risk*' has been added in response to the RFI 8dii request for an assessment of cumulative impacts on migratory bird populations, considering the effects of the

Irish Sea Phase 1 ORE projects and other existing or proposed plans and projects affecting the same populations. A collaborative approach has been undertaken by the Irish Sea Phase 1 ORE projects, providing cumulative migratory bird collision modelling as set out in Appendix A15.4.

15.9.1 Overview

There are no changes to this section. Refer to Section 15.9.1 of Chapter 15 in the 2024 EIAR.

15.9.2 Offshore and intertidal ornithology cumulative screening exercise

There are no changes to this section. Refer to Section 15.9.2 of Chapter 15 in the 2024 EIAR.

15.9.3 Projects considered in the cumulative effects assessment

This section has been updated to reflect the new tiering system as requested by RFI 5 in line with the NSIP Guidance and to include additional projects that now have publicly available information on their impacts since the submission of the 2024 EIAR. In addition, the project alone numbers within the cumulative section have been revised to reflect the introduction of the PFI and the additional NWIS DAS data.

Due to the large number of updates, from this point forward, the subsections within Section 15.9.3 should be considered a full replacement of the equivalent text presented in the 2024 EIAR.

The planned, existing and/or approved projects selected through the screening exercise as potentially relevant to the assessment of impacts to offshore and intertidal ornithology are presented in Table A15.48.

The tiers for the assessment are:

- Tier 1 – All existing, submitted and approved projects (not yet in operation/part of baseline), including the OMF option being considered which involves the adaption and leasing part of an existing port facility at Greenore (further detail is provided in Chapter A6: Description of the Proposed Development Offshore) and the East Coast Phase One Projects.
- Tier 2 – All projects that have scoping reports, or have a MAC
- Tier 3 – All other projects including existing and/or approved development that have been identified in the relevant Development Plans and other plans and programmes as appropriate.

The tiering structure is intended to provide an understanding of the potential for likely significant effects of the proposed development with the construction tier one projects; followed by a cumulative assessment of the likely significant effect of that scenario combined with tier two projects; and lastly the combination of tier one and tier two with all other existing and/or approved projects that have been screened in (tier three)..

It should be noted that several OWFs included within the cumulative assessment are operational. For these projects, predicted impacts are generally considered less influential because they form part of the existing baseline environment. In many cases, these OWFs have been in operation long enough that any associated effects are already reflected in observed demographic rates and regional population trends. There is also evidence from post-construction that birds may become habituated to these impacts over time, thus older OWFs are expected to have a reduced magnitude of impact relative to those predicted from their application. Despite this, operational OWFs remain included within this cumulative assessment as a precautionary approach. Although they are part of the baseline, there remains potential for some impacts to not be fully accounted for. For example, it is unknown whether OWF impacts are accounted for within demographic rates used within the assessment. Demographic rates used from Horswill and Robinson (2015) have been collected over a long time period extending to before the presence of included operational OWFs, and it is unlikely that impacts on these rates are accounted for within the baseline mortality. Including operational OWFs within the cumulative assessment therefore provides a conservative and robust approach, and is in line with the approach taken across the majority of UK projects.

Other impacts on birds, for example fisheries bycatch, are not included in the cumulative longlist. These longstanding impacts are considered to be part of the baseline and there is generally inconsistent and unreliable data to quantify any impacts. Therefore, impacts from these industries (such as fisheries) are not included in the longlist.

While other cable laying operations could take place at the same time as the installation of cables for the proposed development ECC and inter-array cables, it is considered unlikely that this would contribute to a cumulative disturbance effect as the duration of cable laying operations within sensitive ornithological areas is assumed to last for 12 months for any particular project, and the ZoI is considered comparatively small e.g. 3km radius around cable laying vessels. Therefore the cumulative impact from all projects, even if cable laying operations were to coincide, would be negligible.

Within the Irish Sea, impacts resulting from aggregates, oil and gas, cabling projects and commercial shipping are not considered relevant to the assessment of cumulative effects on ornithological receptors. This is due to the following:

- Impacts are already accounted for within the ornithology baseline
- There is no conceptual and/or effect-receptor pathway from these projects/plans
- There is no temporal overlap between projects/plans; and/or
- There is low data confidence or there isn't sufficient data available to undertake an assessment.

The cumulative effects assessment considers all OWFs at all stages of development and other marine developments to which ornithological receptors in the study area may have connectivity to. However, impacts are only considered in the quantitative assessment if publicly available information on project impacts are available.

All projects within Irish and west coast UK waters were included in the cumulative assessment to ensure impacts are assessed at the appropriate ecological scale, reflecting the shared and highly mobile nature of seabird populations across the Irish Sea; these populations utilise interconnected foraging areas, migration routes and seasonal habitats that cross jurisdictional boundaries, meaning that developments across this wider region have the potential to contribute cumulatively to the same regional and biogeographic populations, and their inclusion therefore represents a precautionary, consistent and guidance-aligned approach to capturing the full extent of potential additive effects and avoiding underestimation of cumulative impacts.

Projects which have been screened into the assessment and their relevant tiers are presented in Table A15.48 below. Distances have been measured to the array area rather than the PFI to remain consistent with other receptor groups within the EIAR and to apply a precautionary approach, since the PFI lies wholly within the array area.

For projects in early stages of the planning process (Tier 2 and Tier 3) and where there is currently insufficient information to incorporate these into a reliable cumulative assessment, these projects have not been included in the assessment and are therefore not featured in the shortlist.

Table A15.48 Projects and plans considered within the cumulative impact assessment

| Development type | Project | Current Status | Data confidence | Distance to the proposed development | | Justification for screening into the cumulative effects assessment |
|------------------|-----------------------|----------------|--|--------------------------------------|--------|--|
| | | | | Array area | ECC | |
| Tier 1 | | | | | | |
| OWFs | Oriel Wind Park | Pre-consent | High | 16.9km | 21.6km | Overlap in construction period, Oriel Wind Park due to construct during 2026-2028 |
| OWFs | Dublin Array | Pre-consent | Medium – original submission available at the time of writing. | 32.9km | 37.6km | Overlap in construction period, Dublin Array due to construct during 2028-2032 |
| OWFs | Codling Wind Park | Pre-consent | High | 50.9km | 56.9km | Overlap in construction period, with Codling Wind Park due to construct during 2027-2028 |
| OWFs | Arklow Bank Phase 2 | Pre-consent | High | 76.4km | 80.0km | Overlap in construction period with Arklow Bank Phase 2 2026-2030 |
| OWF | Arklow Bank Phase one | Operational | Medium – consented pre-2015 | 88.3 | 91.3 | Arklow Bank Phase one will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Morgan | Consented | High | 111.5 | 119.9 | Morgan is expected to be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Moor Vannin | Pre-Consent | High | 118.0 | 126.5 | Overlap in construction period with Moor Vannin 2028 - 2032. |
| OWF | Mona | Consented | High | 117.3 | 124.8 | Mona is expected to be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Awel-y-Mor | Consented | High | 131.6 | 139.5 | Awel-y-Mor is expected to be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |

| Development type | Project | Current Status | Data confidence | Distance to the proposed development | | Justification for screening into the cumulative effects assessment |
|------------------|----------------------|----------------|---|--------------------------------------|-------|---|
| | | | | Array area | ECC | |
| OWF | Walney Extension 3 | Operational | Medium – consented pre-2015 | 133.3 | 141.8 | Walney Extension 3 will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Walney Extension 4 | Operational | Medium – consented pre-2015 | 138.6 | 147.0 | Walney Extension 4 will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Morecambe | Consented | High | 138.9 | 146.5 | Morecambe will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Gwynt y Mor | Operational | Low (older project and impacts have been gap-filled for multiple species) | 143.2 | 151.2 | Gwynt y Mor will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Rhyl Flats | Operational | Low (older project and impacts have been gap-filled for multiple species) | 144.5 | 152.8 | Rhyl Flats will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Walney 2 | Operational | Low (older project and impacts have been gap-filled for multiple species) | 148.3 | 156.7 | Walney 2 will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | West of Duddon Sands | Operational | Medium – consented pre-2015 | 153.2 | 161.5 | West of Duddon Sands will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Walney 1 | Operational | Low (older project and impacts have been gap-filled for multiple species) | 153.7 | 162.0 | Walney 1 will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |

| Development type | Project | Current Status | Data confidence | Distance to the proposed development | | Justification for screening into the cumulative effects assessment |
|------------------|---------------------------|----------------|---|--------------------------------------|-------|---|
| | | | | Array area | ECC | |
| OWF | North Hoyle | Operational | Low (older project and impacts have been gap-filled for multiple species) | 157.5 | 165.5 | North Hoyle will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Ormonde | Operational | Low (older project and impacts have been gap-filled for multiple species) | 160.7 | 169.1 | Ormonde will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Burbo Bank Extension | Operational | Medium – consented pre-2015 | 163.4 | 171.1 | Burbo Bank Extension will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Barrow | Operational | Low (older project and impacts have been gap-filled for multiple species) | 167.7 | 175.9 | Barrow will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Burbo Bank | Operational | Low (older project and impacts have been gap-filled for multiple species) | 173.6 | 181.3 | Burbo Bank will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Robin Rigg West | Operational | Low (older project and impacts have been gap-filled for multiple species) | 176.7 | 184.9 | Robin Rigg West will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Robin Rigg East | Operational | Low (older project and impacts have been gap-filled for multiple species) | 178.8 | 186.9 | Robin Rigg East will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Erebus Floating Wind Demo | Consented | High | 235.1 | 239.6 | Erebus is expected to be operational during the construction phase of the proposed development. Operational OWF projects are |

| Development type | Project | Current Status | Data confidence | Distance to the proposed development | | Justification for screening into the cumulative effects assessment |
|--|----------------|----------------|-----------------|--------------------------------------|-------|--|
| | | | | Array area | ECC | |
| | | | | | | considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Lyr 1 | Pre-Consent | High | 244.7 | 248.8 | Lyr 1 is expected to be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | White Cross | Consented | High | 274.7 | 280.6 | White Cross is expected to be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | Twin Hub | Operational | High | 358.5 | 362.5 | Twin Hub will be operational during the construction phase of the proposed development. Operational OWF projects are considered as part of a precautionary approach, despite the habituation of birds to the impacts. |
| OWF | West of Orkney | Consented | High | 656.1 | 566.7 | Overlap in construction period with West of Orkney 2027 - 2030. |
| Tier 2 | | | | | | |
| In Stage 2: Screening, there were no projects identified with the potential for interaction between effects with the proposed development. | | | | | | |
| Tier 3 | | | | | | |
| In Stage 2: Screening, there were no projects identified with the potential for interaction between effects with the proposed development. | | | | | | |

As outlined in Section 15.9.2, the cumulative effects assessment considers the effects on ornithological receptors from the proposed development alongside those from other relevant OWFs (utilising the tiering system described in the methodology section).

Of the existing projects within the region, many are older developments that did not carry out certain impact assessments (e.g. displacement and/or collision risk) for species such as gannet, fulmar, Manx shearwater and gulls due to limited data at the time on behavioural responses of these species to OWFs. Therefore, information on operational developments have been included only where information is available.

15.9.4 Project impacts and options included in the assessment

The identification of potential impacts for the cumulative assessment has been undertaken by considering the relevant characteristics from both project options (refer to Section 15.4.1) and the potential for a pathway for them to have direct and indirect effects on known receptors (as identified in Section 15.3) when combined with other projects.

For each impact, the project option with the greatest potential for a likely significant effect has been determined based on the comparison and justification provided in Table A15.11. The impacts considered in the cumulative assessment are presented in Table A15.49. As the residual effects for Project Option 1 and Project Option 2 are the same (as identified in Section 15.7), the cumulative effects assessment presented in this section applies to both options.

The cumulative effects assessment for the proposed development considers the following impacts:

- Disturbance and displacement in the construction phase (PFI only)
- Disturbance and displacement in the operational phase (PFI only)
- Collision risk in the operational phase; and
- Combined collision risk and displacement risk in the operational phase.
- For several impacts assessed for the proposed development alone in Section 15.5, no further consideration is given at the cumulative level. This includes:
 - Disturbance and displacement in the ECC (construction phase), as likely significant effects on all receptors were assessed as negligible magnitude at most, with all impacts resulting from the proposed development being spatially and temporally limited;
 - Indirect impacts due to impacts on prey, since the contribution from the proposed development is low and is dependent on a temporal and spatial co-incidence of impacts on prey from other plans or projects, which is not considered to be a risk; and
 - Indirect impacts due to accidental pollution which is also considered negligible following project mitigation, and the same is expected of other OWFs in the Irish/Celtic Sea region. There is therefore not considered any potential for pollution effects at the cumulative level.

Table A15.49 Potential cumulative impacts and tiers for assessment (replaces Table 15.64 in Chapter 15 of the 2024 EIAR)

| Potential cumulative impact | Phase | Tiers and Projects | Justification for inclusion in cumulative assessment |
|---|--------------|---------------------|---|
| 1. Disturbance and displacement (PFI) | Construction | Tiers 1 - OWFs only | The location and nature of activities involved in the construction, operation and/or decommissioning of the projects has the potential to affect offshore and intertidal ornithology within the Irish Sea region |
| 2. Disturbance and displacement (PFI) | Operational | Tier 1 - OWFs only | The location and nature of activities involved in the construction, operation and/or decommissioning of the projects has the potential to affect offshore and intertidal ornithology within the Irish Sea region |
| 3. Collision risk | Operational | Tier 1 - OWFs only | The location and nature of activities involved in the construction, operation and/or decommissioning of the projects has the potential to affect offshore and intertidal ornithology within the Irish Sea region Project option with the greatest potential magnitude for likely significant effects used on a species-by-species basis |
| 4. Combined collision risk and displacement | Operational | Tier 1 - OWFs only | The location and nature of activities involved in the construction, operation and/or decommissioning of the projects has the potential to affect offshore and intertidal ornithology within the Irish Sea region Only assessed for gannet, for which Project Option 1 predicts the highest number of collisions (with no difference across project options for displacement impacts) |

15.9.5 Cumulative Impact 1: Disturbance and displacement (construction phase)

During the construction phase, there is potential for cumulative disturbance and displacement effects due to vessel activity and the presence of offshore infrastructure. As outlined in Section 15.5.2.1, these impacts are expected to be spatially and temporally limited in comparison to the operational phase, and therefore displacement impacts used are 50% of those used in the operational assessment.

The cumulative assessment considers only projects which will have the potential for construction overlap with the proposed development, notably Mooir Vannin, Awel-y-Mor, Morgan, Mona, Morecambe, West of Orkney, Erebus, White Cross, and Phase one projects. The cumulative assessment in the construction phase therefore only considers these projects. It is noted that these projects (with the exception of Awel-y-Mor and Erebus) do not yet have consent or a confirmed route to market, and therefore this approach is highly precautionary by assuming they will all be constructing at the same time. Additionally, as outlined in Table A15.48, current timelines suggest that these projects (with the exception of Phase one projects) will be operational, not constructing during the construction phase of the proposed development, and therefore would not be considered relevant to this assessment (i.e., they would only be relevant in the operational phase assessment for which they are already included). However, since the potential for construction overlap cannot be ruled out, they have been included within this assessment on a precautionary basis.

15.9.5.1 Guillemot

Sensitivity of guillemot

As outlined in Section 15.5, guillemot have an overall sensitivity of medium and are assessed using a displacement rate of 25% and a mortality rate of 1%, with a displacement rate of 30% displacement and a mortality rate range of 1% to 5% also presented.

As outlined in Table 15.14 of the 2024 EIAR, two bio-season approaches are considered for guillemot, with a more ecologically relevant site-specific approach to bio-seasons forming the main basis of the assessment, and results based on the Furness approach to bio-seasons used for other species also presented.

Tier 1

Magnitude of impact

The estimated annual mean peak abundance of guillemot from relevant projects in the array area plus 2km buffer is presented in Table A15.50 below.

Table A15.50 Guillemot cumulative abundance totals for tier 1 projects during the construction phase

| Project | Breeding season cumulative abundance | Non-breeding season cumulative abundance | Annual total cumulative abundance |
|--|--------------------------------------|--|-----------------------------------|
| Mooir Vannin | 2,112 | 2,307 | 4,419 |
| West of Orkney | 4,861 | 4,275 | 9,136 |
| Arklow Phase 2 | 9,010 | 3,991 | 13,001 |
| Oriel | 820 | 2,670 | 3,490 |
| Dublin Array | 18,687 | 2,063 | 20,750 |
| Codling | 3,624 | 13,340 | 16,964 |
| Total (without the proposed development) | 32,141 | 28,646 | 67,759 |
| The proposed development (site-specific approach to bio-seasons) | 988 | 21,074 | 22,061 |

| Project | Breeding season cumulative abundance | Non-breeding season cumulative abundance | Annual total cumulative abundance |
|---|--------------------------------------|--|-----------------------------------|
| The proposed development (Furness approach to bio-seasons) | 16,318 | 18,766 | 35,084 |
| Total (with the proposed development) – site-specific approach to bio-seasons | 33,128 | 49,720 | 82,848 |
| Total (with the proposed development) - Furness approach to bio-seasons | 48,459 | 47,412 | 95,871 |

During the breeding season, the cumulative mean peak abundance for guillemot is 33,128 individuals. Based on 25% displacement and 1% mortality, 83 (82.8) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 190,073 individuals (Table A15.6) and a baseline mortality of 26,800 individuals per annum (based on an average mortality rate of 0.141; Table A15.7), the addition of 121 cumulative displacement consequent mortalities would represent a 0.310% increase in baseline mortality. Potential cumulative impacts based on 30% displacement and 3% to 5% mortality, and based on the Furness approach to bio-seasons, are presented in Table A15.51.

During the non-breeding bio-season, the cumulative mean peak abundance for guillemot is 49,720 individuals within the array area plus 2km buffer. Based on 25% displacement and 1% mortality, 124 (124.3) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a non-breeding bio-season regional population size of 1,332,623 individuals (Table A15.6) and a baseline mortality of 187,900 individuals per annum (based on an average mortality rate of 0.141; Table A15.7), the addition of 124 cumulative displacement consequent mortalities would represent a 0.066% increase in baseline mortality. Potential cumulative impacts based on 30% displacement and 1% and 3% mortality, and based on the Furness approach to bio-seasons, are presented in Table A15.51.

The cumulative annual total abundance of guillemot is 95,871 individuals. Based on 25% displacement and 1% mortality, 207 (207.1) individuals are predicted to be at risk of displacement consequent mortality per annum, of which the proposed development contributes 55(55.2) individuals.

Based on the largest regional population size of 1,332,623 individuals (Table A15 6) and a baseline mortality of 187,900 individuals per annum (based on an average mortality rate of 0.141; Table A 15 7), the addition of 207 cumulative displacement consequent mortalities would represent a 0.111% increase in baseline mortality. Considering the biogeographic population size of 4,125,000, with a baseline mortality of 581,625 individuals per annum, the addition of 207 cumulative displacement consequent mortalities would represent a 0.036% increase in baseline mortality. Potential cumulative impacts based on 30% displacement and 1% and 3% mortality and based on the Furness approach to bio-seasons are presented in Table A15.51.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement for tier 1 projects would be low (Table 15.7 of the 2024 EIAR).

Table A15.51 Predicted cumulative annual displacement impacts on guillemot from the proposed development during the construction phase for tier 1 projects

| Bio-season | Cumulative mean peak abundance (PFI plus 2km buffer) | Estimated mortality | | Percentage increase in baseline mortality | | | |
|--|--|--------------------------------|---------------------------------------|---|--------------------------------|---------------------------------------|---------------------------------------|
| | | 25% displacement, 1% mortality | 30% displacement, 1% and 3% mortality | 30% displacement, 3% and 5% mortality | 25% displacement, 1% mortality | 30% displacement, 1% and 3% mortality | 30% displacement, 3% and 5% mortality |
| Furness approach to bio-seasons | | | | | | | |
| Breeding | 48,459 | 121.1 | 436.1 | 726.9 | 0.453% | 1.633% | 2.722% |
| Non - breeding | 47,412 | 118.5 | 142.2 | 426.7 | 0.063% | 0.076% | 0.228% |
| Annual (regional population) | 95,871 | 239.7 | 578.4 | 1,153.6 | 0.128% | 0.309% | 0.616% |
| Annual (biogeographic) | 95,871 | 239.7 | 578.4 | 2,307.2 | 0.041% | 0.100% | 0.398% |
| Site-specific approach to bio-seasons | | | | | | | |
| Breeding | 33,128 | 82.8 | 298.2 | 496.9 | 0.310% | 1.117% | 1.861% |
| Non - breeding | 49,720 | 124.3 | 149.2 | 447.5 | 0.066% | 0.080% | 0.239% |
| Annual (regional population) | 82,848 | 207.1 | 447.3 | 944.4 | 0.111% | 0.239% | 0.504% |
| Annual (biogeographic) | 82,848 | 207.1 | 447.3 | 1,888.8 | 0.036% | 0.077% | 0.326% |

Significance of the effect

Overall, it is predicted that the sensitivity of guillemot to disturbance and displacement during construction is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is low. The medium sensitivity and low magnitude of the impact on guillemot results in a slight cumulative effect for Project Option 1 and Project Option 2, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for guillemot.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for guillemot.

15.9.5.2 Razorbill

Sensitivity of razorbill

As outlined in Section 15.5, razorbill have an overall sensitivity of medium and are assessed using a displacement rate of 25% and a mortality rate of 1%, with a displacement rate of 30% displacement and a mortality rate range of 1% to 5% also presented.

Tier 1

Magnitude of impact

The estimated annual mean peak abundance of razorbill from relevant projects in the array area plus 2km buffer is presented in Table A15.52 below.

Table A15.52 Razorbill cumulative abundance totals for tier 1 projects during the construction phase

| Project | Spring Migration | Breeding | Autumn Migration | Migration-free winter | Annual total abundance |
|--|-------------------------|-----------------|-------------------------|------------------------------|-------------------------------|
| Moor Vannin | 1,194 | 76 | 653 | 214 | 2,136 |
| West of Orkney | 97 | 70 | 144 | 15 | 326 |
| Arklow Phase 2 | 1,194 | 76 | 653 | 214 | 2,136 |
| Oriel | 3,341 | 488 | 2,570 | 2,558 | 8,957 |
| Dublin Array | 859 | 353 | 962 | 512 | 2,686 |
| Codling | 478 | 1,068 | 2,070 | 281 | 3,897 |
| Total (without the proposed development) | 6,378 | 2,660 | 10,759 | 4,220 | 24,016 |
| The proposed development (site-specific approach to bio-seasons) | 915 | 1,110 | 4,896 | 1,225 | 8,146 |
| The proposed development | 915 | 175 | 4,896 | 1,225 | 7,211 |

| Project | Spring Migration | Breeding | Autumn Migration | Migration-free winter | Annual total abundance |
|--|------------------|--------------|------------------|-----------------------|------------------------|
| (Furness approach to bio-seasons) | | | | | |
| Total (with the proposed development) – site-specific approach to bio-seasons | 7,293 | 3,769 | 15,655 | 5,445 | 32,162 |
| Total (with the proposed development) - Furness approach to bio-seasons | 7,293 | 2,835 | 15,655 | 5,445 | 31,228 |

During the breeding season, the cumulative mean peak abundance for razorbill is 2,835 individuals. Based on 25% displacement and 1% mortality, seven (7.1) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 49,298 individuals (Table A15.6) and a baseline mortality of 6,359 individuals per annum (based on an average mortality rate of 0.130; Table A.15.7), the addition of seven cumulative displacement consequent mortalities would represent a 0.111% increase in baseline mortality. Potential cumulative impacts based on 30% displacement and 3% to 5% mortality are presented in Table A15.53.

During the spring migration bio-season, the cumulative mean peak abundance for razorbill is 21,355 individuals within the array area plus 2km buffer. Based on 25% displacement and 1% mortality, 39 (39.1) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a spring migration bio-season regional population size of 632,453 individuals (Table A15.7) and a baseline mortality of 81,586 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of 39 cumulative displacement consequent mortalities would represent a 0.047% increase in baseline mortality. Potential cumulative impacts based on 30% displacement and 1% and 3% mortality and based on the Furness approach to bio-seasons are presented in Table A15.53.

During the autumn migration bio-season, the cumulative mean peak abundance for razorbill is 7,293 individuals within the array area plus 2km buffer. Based on 25% displacement and 1% mortality, 18 (18.2) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a autumn migration bio-season regional population size of 632,453 individuals (Table A15.7) and a baseline mortality of 81,586 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of 18 cumulative displacement consequent mortalities would represent a 0.038% increase in baseline mortality. Potential cumulative impacts based on 30% displacement and 1% and 3% mortality and based on the Furness approach to bio-seasons are presented in Table A.15.71.

During the migration-free winter, the cumulative mean peak abundance for razorbill is 15,445 individuals within the array area plus 2km buffer. Based on 25% displacement and 1% mortality, 14 (13.6) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a migration-free winter bio-season regional population size of 366,961 individuals (Table A15.7) and a baseline mortality of 47,338 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of 14 cumulative displacement consequent mortalities would represent a 0.017% increase in baseline mortality. Potential cumulative impacts based on 30% displacement and 1% and 3% mortality and based on the Furness approach to bio-seasons are presented in Table A15.53.

The cumulative annual total abundance of razorbill is 31,228 individuals. Based on 25% displacement and 1% mortality, 78 (78.1) individuals are predicted to be at risk of displacement consequent mortality per annum, of which the proposed development contributes 18 (18.0) individuals.

Based on the largest regional population size of 632,453 individuals (Table A15.7) and a baseline mortality of 81,586 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of 78 cumulative displacement consequent mortalities would represent a 0.095% increase in baseline mortality. Considering the biogeographic population size of 1,707,000, with a baseline mortality of 222,251 individuals per annum, the addition of 78 cumulative displacement consequent mortalities would represent a 0.035% increase in baseline mortality. Potential impacts based on the Guidance Approach to displacement and mortality rates are presented in Table A15.53.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement for tier 1 projects would be low (Table 15.7 of the 2024 EIAR).

Table A15.53 Predicted cumulative annual displacement impacts on razorbill from the proposed development during the construction phase for tier 1 projects

| Bio-season | Cumulative mean peak abundance (PFI plus 2km buffer) | Estimated mortality | | | Percentage increase in baseline mortality | | |
|--|--|--------------------------------|---------------------------------------|---------------------------------------|---|---------------------------------------|---------------------------------------|
| | | 25% displacement, 1% mortality | 30% displacement, 1% and 3% mortality | 30% displacement, 3% and 5% mortality | 25% displacement, 1% mortality | 30% displacement, 1% and 3% mortality | 30% displacement, 3% and 5% mortality |
| Furness approach to bio-seasons | | | | | | | |
| Autumn migration | 15,654.9 | 39.1 | 47.0 | 140.9 | 0.047% | 0.057% | 0.171% |
| Breeding | 3,769.1 | 9.4 | 33.9 | 56.5 | 0.146% | 0.528% | 0.880% |
| Spring migration | 7,293.0 | 18.2 | 21.9 | 65.6 | 0.038% | 0.046% | 0.137% |
| Migration-free winter | 5,445.2 | 13.6 | 16.3 | 49.0 | 0.017% | 0.020% | 0.060% |
| Annual (regional population) | 32,162.2 | 80.4 | 119.1 | 624.1 | 0.098% | 0.145% | 0.758% |
| Annual (biogeographic) | 32,162.2 | 80.4 | 238.2 | 624.1 | 0.036% | 0.107% | 0.281% |
| Site-specific approach to bio-seasons | | | | | | | |
| Autumn migration | 15,654.9 | 39.1 | 47.0 | 140.9 | 0.047% | 0.057% | 0.171% |
| Breeding | 2,834.6 | 7.1 | 25.5 | 42.5 | 0.111% | 0.397% | 0.662% |
| Spring migration | 7,293.0 | 18.2 | 21.9 | 65.6 | 0.038% | 0.046% | 0.137% |
| Migration-free winter | 5,445.2 | 13.6 | 16.3 | 49.0 | 0.017% | 0.020% | 0.060% |
| Annual (regional population) | 31,227.7 | 78.1 | 110.7 | 596.1 | 0.095% | 0.134% | 0.724% |
| Annual (biogeographic) | 31,227.7 | 78.1 | 221.4 | 596.1 | 0.035% | 0.100% | 0.268% |

Significance of the effect

Overall, it is predicted that the sensitivity of razorbill to disturbance and displacement during construction is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is low. The medium sensitivity and low magnitude of the impact on razorbill results in a slight cumulative effect for Project Option 1 and Project Option 2, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for razorbill.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for razorbill.

15.9.5.3 Puffin

Sensitivity of puffin

As outlined in Section 15.5, puffin have an overall sensitivity of medium, and are assessed using a displacement rate of 25% and a mortality rate of 1%, with a displacement rate of 30% displacement and a mortality rate range of 1% to 5% mortality also presented.

Tier 1

Magnitude of impact

The estimated annual mean peak abundance of puffin from relevant projects in the array area plus 2km buffer is presented in Table A 15.54 below.

Table A 15.54 Puffin cumulative abundance totals for tier 1 projects during the construction phase

| Project | Breeding season cumulative abundance | Non-breeding season cumulative abundance | Annual total cumulative abundance |
|---|---|---|--|
| Moor Vannin | 87.5 | 12.0 | 99.5 |
| West of Orkney | 5,272.0 | 1,177.0 | 6,449.0 |
| Arklow Phase 2 | 17.5 | 20.0 | 37.5 |
| Oriel | NA | NA | NA |
| Dublin Array | NA | NA | NA |
| Codling | 93.7 | 106.3 | 200.1 |
| Total (without the proposed development) | 199 | 1,315 | 1,514 |
| The proposed development | 17.3 | 14.2 | 31.5 |
| Total (with the proposed development) | 216.0 | 1,329.5 | 1,545.5 |

During the breeding season, the cumulative mean peak abundance for puffin is 216 individuals within the array area plus 2km buffer. Based on 25% displacement and 1% mortality, one (0.5) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum. Based on 30%

displacement and 3% and 5% mortality, the estimated cumulative displacement consequent mortality is between two (1.9) and three (3.2) individuals per annum.

Based on a breeding bio-season regional population size of 79,939 individuals (Table A15.7) and a baseline mortality of 9,513 individuals per annum (based on an average mortality rate of 0.119; Table A15.8), the addition of one cumulative displacement consequent mortalities would represent a 0.005% increase in baseline mortality. Potential cumulative impacts based on 30% displacement and 3% to 5% mortality are presented in Table A15.55.

During the non-breeding bio-season, the cumulative mean peak abundance for puffin is 2,317 individuals within the array area plus 2km buffer. Based on 25% displacement and 1% mortality, three (3.3) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum. Based on 30% displacement and 1% and 3% mortality, the estimated cumulative displacement consequent mortality is between four (4.0) and 12 (12.0) individuals per annum.

Based on a non-breeding bio-season regional population size of 300,427 individuals (Table A15.7) and a baseline mortality of 35,751 individuals per annum (based on an average mortality rate of 0.119; Table A15.8), the addition of three cumulative displacement consequent mortalities would represent a 0.009% increase in baseline mortality. Potential cumulative impacts based on 30% displacement and 1% and 3% mortality and based on the Furness approach to bio-seasons are presented in Table A15.55.

The cumulative annual total abundance of puffin is 1,546 individuals. Based on 25% displacement and 1% mortality, four (3.9) individuals are predicted to be at risk of displacement consequent mortality per annum, of which the proposed development contributes less than one (0.1) individual.

Based on the largest regional population size of 300,427 individuals (Table A15.7) and a baseline mortality of 35,751 individuals per annum (based on an average mortality rate of 0.119; Table A15.8), the addition of four cumulative displacement consequent mortalities would represent a 0.011% increase in baseline mortality. Considering the biogeographic population size of 11,840,000, with a baseline mortality of 1,408,960 individuals per annum, the addition of four cumulative displacement consequent mortalities would represent a <0.001% increase in baseline mortality. Potential cumulative impacts based on 30% displacement and 1% and 5% mortality and based on the Furness approach to bio-seasons are presented in Table A15.55.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement for tier 1 projects would be negligible (Table 15.7 of the 2024 EIAR).

Table A15.55 Predicted cumulative annual displacement impacts on guillemot from the proposed development during the construction phase for tier 1 projects

| Bio-season | Cumulative mean peak abundance (PFI plus 2km buffer) | Estimated mortality | | | Percentage increase in baseline mortality | | |
|------------------------------|--|--------------------------------|---------------------------------------|---------------------------------------|---|---------------------------------------|---------------------------------------|
| | | 25% displacement, 1% mortality | 30% displacement, 1% and 3% mortality | 30% displacement, 3% and 5% mortality | 25% displacement, 1% mortality | 30% displacement, 1% and 3% mortality | 30% displacement, 3% and 5% mortality |
| Breeding | 216.0 | 0.5 | 1.9 | 3.2 | 0.005% | 0.020% | 0.034% |
| Non - breeding | 1,329.5 | 3.3 | 4.0 | 12.0 | 0.009% | 0.011% | 0.034% |
| Annual (regional population) | 1,545.5 | 3.9 | 5.9 | 15.2 | 0.011% | 0.017% | 0.043% |
| Annual (biogeographic) | 1,545.5 | 3.9 | 11.9 | 15.2 | 0.000% | 0.000% | 0.001% |

Significance of the effect

Overall, it is predicted that the sensitivity of puffin to disturbance and displacement during construction is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is negligible. The medium sensitivity and negligible magnitude of the impact on razorbill results in an imperceptible cumulative effect for Project Option 1 and Project Option 2, which is not significant in EIA terms based on the matrix approach in Table 15.18 of the 2024 EIAR.

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for puffin.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for puffin.

15.9.5.4 Manx shearwater

Sensitivity of Manx shearwater

As outlined in Section 15.5, Manx shearwater have an overall sensitivity of medium, and are assessed using a displacement rate of 5% and a mortality rate of 1%.

Tier 1

Magnitude of impact

The estimated annual mean peak abundance of Manx shearwater from relevant projects in the array area plus 2km buffer is presented in Table A15.56 below.

Table A15.56 Manx shearwater cumulative abundance totals for tier 1 projects during the construction phase

| Project | Spring Migration | Breeding | Autumn Migration | Annual total abundance |
|---|-------------------------|-----------------|-------------------------|-------------------------------|
| Moor Vannin | NA | 1,401 | 31 | 1,431 |
| West of Orkney | NA | 8 | 3 | 11 |
| Arklow Phase 2 | NA | NA | NA | NA |
| Oriel | NA | 690 | 517 | 1,207 |
| Dublin Array | 4 | 2,198 | 176 | 2,378 |
| Codling | 780 | 180 | 1,125 | 2,086 |
| Total (without the proposed development) | 784 | 4,477 | 1,852 | 7,113 |
| The proposed development | NA | 3,975 | 458 | 4,433 |
| Total (with the proposed development) | 784 | 8,452 | 2,310 | 11,546 |

During the breeding season, the cumulative abundance for Manx shearwater is 8,452 individuals within the

array area plus 2km buffer. Based on 5% displacement and 1 mortality, three (3.5) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 2,121,049 individuals (Table A15.7) and a baseline mortality of 275,736 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of three cumulative displacement consequent mortalities would represent a 0.001% increase in baseline mortality.

During the spring migration bio-season, the cumulative abundance for Manx shearwater is 784 individuals within the array area plus 2km buffer. Based on 5% displacement and 1% mortality, less than one (0.4) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a spring migration bio-season regional population size of 1,585,521 individuals (Table A15.7) and a baseline mortality of 206,118 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of 16 cumulative displacement consequent mortalities would represent a <0.001% increase in baseline mortality.

During the autumn migration bio-season, the cumulative abundance for Manx shearwater is 2,279 individuals within the array area plus 2km buffer. Based on 10% displacement and 1% mortality, one (1.1) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on an autumn migration bio-season regional population size of 1,585,521 individuals (Table A15.7) and a baseline mortality of 206,118 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of seven cumulative displacement consequent mortalities would represent a 0.001% increase in baseline mortality.

The cumulative annual total abundance of Manx shearwater is 10,115 individuals. Based on 5% displacement and 1% mortality, five (5.1) individuals are predicted to be at risk of displacement consequent mortality per annum, of which the proposed development contributes two (2.2) individuals.

Based on the largest regional population size of 1,585,521 individuals (Table A15.7) and a baseline mortality of 206,118 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of five cumulative displacement consequent mortalities would represent a 0.002% increase in baseline mortality. Considering the biogeographic population size of 2,000,000, with a baseline mortality of 260,000 individuals per annum, the addition of five cumulative displacement consequent mortalities would represent a 0.002% increase in baseline mortality.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement for tier 1 projects would be negligible (Table 15.7 of the 2024 EIAR).

Table A15.57 Predicted cumulative annual displacement impacts on Manx shearwater from the proposed development during the construction phase for tier 1 projects.

| Bio-season (months) | Cumulative mean peak abundance (PFI plus 2km buffer) | Estimated mortality | Percentage increase in baseline mortality |
|------------------------------|--|--------------------------------|---|
| | | 10% displacement, 1% mortality | 10% displacement, 1% mortality |
| Autumn migration | 2,279.1 | 1.1 | 0.001% |
| Breeding | 7,051.4 | 3.5 | 0.001% |
| Spring migration | 784.4 | 0.4 | 0.000% |
| Annual (regional population) | 10,114.9 | 5.1 | 0.002% |
| Annual (biogeographic) | 10,114.9 | 5.1 | 0.002% |

Significance of the effect

Overall, it is predicted that the sensitivity of Manx shearwater to disturbance and displacement during construction is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is negligible. The medium sensitivity and negligible magnitude of the impact on Manx shearwater results in an imperceptible cumulative effect for Project Option 1 and Project Option 2, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for Manx shearwater.

Tiers 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for Manx shearwater.

15.9.5.5 Gannet

Sensitivity of gannet

As outlined in Section 15.5, gannet have an overall sensitivity of medium, and are assessed using a displacement rate of 35% and a mortality rate of 1%, with a mortality rate range of 1% to 3% also presented.

Tier 1

Magnitude of impact

The estimated annual mean peak abundance of razorbill from relevant projects in the array area plus 2km buffer is presented in Table A 15.58 below.

Table A 15.58 Gannet cumulative abundance totals for tier 1 projects during the construction phase

| Project | Spring Migration | Breeding | Autumn Migration | Annual total abundance |
|---|-------------------------|-----------------|-------------------------|-------------------------------|
| Moor Vannin | 21 | 319 | 161 | 500 |
| West of Orkney | 59 | 958 | 1,171 | 2,188 |
| Arklow Phase 2 | 30 | 72 | 43 | 145 |
| Oriel | 43 | 264 | 336 | 643 |
| Dublin Array | 27 | 700 | 21 | 748 |
| Codling | 105 | 105 | 55 | 265 |
| Total (without the proposed development) | 284 | 1,459 | 1,787 | 3,531 |
| The proposed development | 9 | 270 | 135 | 414 |
| Total (with the proposed development) | 293 | 1,730 | 1,922 | 3,945 |

During the breeding season, the cumulative breeding abundance for gannet is 1,730 individuals. Based on 35% displacement and 1% mortality, six (6.1) individuals are predicted to be at risk of cumulative

displacement consequent mortality per annum. Based on 35% displacement and 3% mortality, the estimated cumulative displacement consequent mortality is 20 (20.2) individuals per annum.

Based on a breeding bio-season regional population size of 632,514 individuals (Table A15.7) and a baseline mortality of 118,027 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of six cumulative displacement consequent mortalities would represent a 0.007% increase in baseline mortality. Potential cumulative impacts based on 35% displacement and 3% mortality are presented in Table A15.59.

During the spring migration bio-season, the cumulative mean peak abundance for gannet is 293 individuals within array areas plus 2km buffer. Based on 35% displacement and 1% mortality, one (1.0) individual is predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a spring migration bio-season regional population size of 643,917 individuals (Table A15.7) and a baseline mortality of 120,155 individuals per annum (based on an average mortality rate of 0.187; Table A15.8)), the addition of one cumulative displacement consequent mortalities would represent a 0.001% increase in baseline mortality. Potential cumulative impacts based on 35% displacement and 3% mortality are presented in Table A15.59.

During the autumn migration bio-season, the cumulative mean peak abundance for gannet is 1,922 individuals within the array area plus 2km buffer. Based on 35% displacement and 1% mortality, seven (6.7) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on an autumn migration bio-season regional population size of 535,183 individuals (Table A15.7) and a baseline mortality of 99,865 cumulative displacement consequent mortalities would represent a 0.007% increase in baseline mortality. Potential cumulative impacts based on 35% displacement and 3% mortality are presented in Table A15.59.

The cumulative annual total abundance of gannet is 3,945 individuals. Based on 35% displacement and 1% mortality, 14 (13.8) individuals are predicted to be at risk of displacement consequent mortality per annum, of which the proposed development contributes one (1.4) mortality per annum.

Based on the largest regional population size of 643,917 individuals (Table A15.7) and a baseline mortality of 120,155 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of 14 cumulative displacement consequent mortalities would represent a 0.011% increase in baseline mortality. Considering the biogeographic population size of 1,180,000, with a baseline mortality of 220,188 individuals per annum, the addition of 14 cumulative displacement consequent mortalities would represent a 0.006% increase in baseline mortality. Potential impacts based on 35% displacement and 3% mortality are presented in Table A15.59.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement for tier 1 projects would be negligible (Table 15.7 of the 2024 EIAR).

Table A15.59 Predicted cumulative annual displacement impacts on gannet from the proposed development during the construction phase for tier 1 projects

| Bio-season (months) | Cumulative mean peak abundance (PFI plus 2km buffer) | Estimated mortality | | Percentage increase in baseline mortality | |
|---------------------|--|--------------------------------|--------------------------------|---|--------------------------------|
| | | 35% displacement, 1% mortality | 35% displacement, 3% mortality | 35% displacement, 1% mortality | 35% displacement, 3% mortality |
| Autumn migration | 1,921.9 | 6.7 | 20.2 | 0.007% | 0.020% |
| Breeding | 1,729.6 | 6.1 | 18.2 | 0.005% | 0.015% |
| Spring migration | 293.0 | 1.0 | 3.1 | 0.001% | 0.003% |
| Annual (regional) | 3,944.5 | 13.8 | 41.4 | 0.011% | 0.034% |

| Bio-season (months) | Cumulative mean peak abundance (PFI plus 2km buffer) | Estimated mortality | | Percentage increase in baseline mortality | |
|------------------------|--|--------------------------------|--------------------------------|---|--------------------------------|
| | | 35% displacement, 1% mortality | 35% displacement, 3% mortality | 35% displacement, 1% mortality | 35% displacement, 3% mortality |
| Annual (biogeographic) | 3,944.5 | 13.8 | 41.4 | 0.006% | 0.019% |

Significance of the effect

Overall, it is predicted that the sensitivity of gannet to disturbance and displacement during construction is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is negligible. The medium sensitivity and negligible magnitude of the impact on gannet results in an imperceptible cumulative effect for Project Option 1 and Project Option 2, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for gannet.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for gannet.

15.9.5.6 Kittiwake

Sensitivity of kittiwake

As outlined in Section 15.5, kittiwake have an overall sensitivity of low, and are assessed using a displacement rate of 15% and a mortality rate range of 1% to 3%.

As outlined in Table 15.14 of the 2024 EIAR, two bio-season approaches are applied for kittiwake. The assessment is primarily based on the more ecologically appropriate site-specific approach, while results using the Furness bio-seasons (applied for other species) are also provided for comparison.

Tier 1

Magnitude of impact

The estimated annual mean peak abundance of kittiwake from relevant projects in the array area plus 2km buffer is presented in Table A15.60 below.

Table A15.60 Kittiwake cumulative abundance totals for tier 1 projects during the construction phase

| Project | Spring Migration | Breeding | Autumn Migration | Annual total cumulative abundance |
|---------------------|------------------|----------|------------------|-----------------------------------|
| Moorir Vannin | 992 | 572 | 551 | 2,115 |
| West of Orkney | 1,217 | 690 | 799 | 2,706 |
| Arklow Bank Phase 2 | 4,075 | 3,733 | 2,483 | 10,291 |
| Oriel | 768 | 74 | 305 | 1,147 |
| Dublin Array | 850 | 622 | 749 | 2,221 |
| Codling | 543 | 1,363 | 586 | 2,492 |

| Project | Spring Migration | Breeding | Autumn Migration | Annual total cumulative abundance |
|---|------------------|--------------|------------------|-----------------------------------|
| Total (excluding the proposed development) | 8,445 | 6,364 | 5,473 | 20,282 |
| The proposed development (migration-free breeding bio-season) | 612 | 594 | 930 | 2136 |
| The proposed development (full breeding bio-season) | 498 | 903 | 486 | 1,887 |
| Total (with the proposed development) - Developer migration-free breeding bio-season | 9,057 | 6,957 | 6,404 | 22,418 |
| Total (with the proposed development) - Developer full breeding bio-season | 8,943 | 7,267 | 5,959 | 22,169 |

During the breeding bio-season, the cumulative mean peak abundance for kittiwake is 9,057 individuals. Based on 15% displacement and 1% and 3% mortality, between 11 (10.9) and 32 (32.7) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 142,464 individuals (Table A15.7) and a baseline mortality of 22,509 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of 11 to 32 displacement consequent mortalities would represent a 0.049% to 0.146% increase in baseline mortality.

During the autumn migration bio-season, the cumulative mean peak abundance for kittiwake is 5,959 individuals within the PFI plus 2km buffer. Based on 15% displacement and 1% and 3% mortality, between nine (8.9) and 27 (26.8) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on autumn migration bio-season regional population size of 933,197 individuals (Table A15.7) and a baseline mortality of 147,165 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of nine to 27 displacement consequent mortalities would represent a 0.006% to 0.018% increase in baseline mortality.

During the spring migration bio-season, the cumulative mean peak abundance for kittiwake is 8,943 individuals within the PFI plus 2km buffer. Based on 15% displacement and 1% and 3% mortality, between 13 (13.4) and 40 (40.2) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on spring migration bio-season regional population size of 713,137 individuals (Table A15.7) and a baseline mortality of 112,462 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of 13 to 40 displacement consequent mortality would represent a 0.012% to 0.036% increase in baseline mortality.

The cumulative annual total abundance of kittiwake is 22,169 individuals. Based on 30% displacement and 1% and 3% mortality, between 33 (33.3) and 100 (99.8) individuals are predicted to be at risk of

displacement consequent mortality per annum, of which the proposed development contributes between three (3.2) and ten (9.6) individuals.

Based on the largest regional population size of 933,197 individuals (Table A15.7) and a baseline mortality of 147,165 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of 33 to 100 displacement consequent mortalities would represent a 0.023% to 0.068% increase in baseline mortality. Considering the biogeographic population size of 1,180,000, with a baseline mortality of 804,270 individuals per annum, the addition of 33 to 100 displacement consequent mortalities would represent a 0.004% to 0.012% increase in baseline mortality.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Table A15.61 Predicted cumulative annual displacement impacts on kittiwake from the proposed development during the construction phase for tier 1 projects

| Bio-season (months) | Cumulative mean peak abundance (PFI plus 2km buffer) | Estimated mortality | | Percentage increase in baseline mortality | |
|--|--|--------------------------------|--------------------------------|---|--------------------------------|
| | | 15% displacement, 1% mortality | 15% displacement, 3% mortality | 15% displacement, 1% mortality | 15% displacement, 3% mortality |
| Furness approach to bio-seasons | | | | | |
| Autumn migration | 5,959.3 | 8.9 | 26.8 | 0.006% | 0.018% |
| Breeding | 7,266.5 | 10.9 | 32.7 | 0.049% | 0.146% |
| Spring migration | 8,943.0 | 13.4 | 40.2 | 0.012% | 0.036% |
| Annual (regional population) | 22,168.8 | 33.3 | 99.8 | 0.023% | 0.068% |
| Annual (biogeographic) | 22,168.8 | 33.3 | 99.8 | 0.004% | 0.012% |
| Site-specific approach to bio-seasons | | | | | |
| Autumn migration | 6,403.7 | 9.6 | 28.8 | 0.007% | 0.020% |
| Breeding | 6,957.3 | 10.4 | 31.3 | 0.046% | 0.139% |
| Spring migration | 9,056.7 | 13.6 | 40.8 | 0.012% | 0.036% |
| Annual (regional population) | 22,417.6 | 33.6 | 100.9 | 0.023% | 0.069% |
| Annual (biogeographic) | 22,417.6 | 33.6 | 100.9 | 0.004% | 0.013% |

Significance of the effect

Overall, it is predicted that the sensitivity of kittiwake to disturbance and displacement during construction is low and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is negligible. The low sensitivity and negligible magnitude of the impact on kittiwake results in an imperceptible cumulative effect for Project Option 1 and Project Option 2, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for kittiwake.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for kittiwake.

15.9.6 Cumulative Impact 2: Disturbance and displacement (operational phase)

The cumulative disturbance and displacement assessment in the operational phase has been fully updated and now incorporates the revised project-alone assessment following the introduction of the PFI, the updated NWIS DAS dataset, and methodological updates arising from other RFI sections. For updates relevant to displacement please see Section 15.5.3.1.

Due to the presence of WTGs and operational and maintenance activities associated with the proposed development and other projects, there is potential for cumulative disturbance and displacement effects. For the cumulative displacement assessment, only projects within Tier 1 were considered, with projects earlier in the planning process (Tiers 2 and 3) lacking publicly available impact estimates. Similarly, for older projects abundance data is often not broken down into seasonal abundances, and therefore only annual totals were available for some projects.

Older projects (i.e. consented or constructed prior to 2015) may be considered as contributing to baseline conditions, as their effects have been acting on the population for an extended period and are therefore already reflected in current demographic rates. As a result, there is the potential for these effects to be implicitly accounted for within the baseline, leading to a degree of double counting if they are also included explicitly within the cumulative assessment. For several historic projects, sufficient data are not available to allow their impacts to be quantified and included cumulatively. However, where relevant data do exist, these projects have been included in the cumulative assessment as a precautionary measure, recognising the inherent difficulty in evidencing the extent to which their effects are already embedded within baseline population metrics.

For the all OWFs, abundance data for the displacement assessment was extracted from the project Environmental Statements. It should be noted that abundance data used from these projects is considered highly precautionary since abundance estimates are presented for the array area plus 4km buffer only (as opposed to the array area plus 2km buffer which is considered relevant for the displacement assessment). This leads to substantially inflated abundance estimates, and therefore overstated impact predictions, for these projects, exceeding what is considered ecologically realistic.

15.9.6.1 Guillemot

Sensitivity of guillemot

As outlined in Section 15.5, guillemot have an overall sensitivity of medium, and are assessed using a displacement rate of 50% and a mortality rate of 1%, with a displacement rate of 60% displacement and a mortality rate range of 1% to 3% (non-breeding) and 3% to 5% (breeding) also presented.

As outlined in Table A15.6 two bio-season approaches are considered for guillemot, with a more ecologically relevant site-specific Approach forming the main basis of the assessment, and results based on the Furness approach used for other species also presented.

Tier 1

Magnitude of impact

The estimated annual mean peak abundance of guillemot from relevant projects in the array area plus 2km buffer is presented in Table A15.62 below.

Table A15.62 Guillemot cumulative abundance totals for Tier 1 projects

| Project | Breeding season cumulative abundance | Non-breeding season cumulative abundance | Annual total cumulative abundance |
|----------------|---|---|--|
| Awel y Mor | 1,569 * | 2,919 | 4,488 |

| Project | Breeding season cumulative abundance | Non-breeding season cumulative abundance | Annual total cumulative abundance |
|--|--------------------------------------|--|-----------------------------------|
| Barrow | 43* | 62 | 105 |
| Burbo Bank | 41* | 58 | 99 |
| Burbo Bank Extension | 1,000* | 1,561 | 2,561 |
| Erebus Floating Demo | 7,001* | 28,338 | 35,339 |
| Gwynt y Mor | 149* | 205 | 354 |
| Llyr 1 | 2,026* | 13,009 | 15,035 |
| Mona | 4,220* | 3,756 | 7,976 |
| Mooir Vannin | 2,112* | 2,307 | 4,419 |
| Morecambe | 6,374* | 8,315 | 14,689 |
| Morgan | 4,010* | 3,824 | 7,834 |
| North Hoyle | 45* | 63 | 108 |
| Ormonde | 912* | 56 | 968 |
| Robin Rigg | 138 * | 88 | 226 |
| Rhyl Flats | 49* | 68 | 117 |
| TwinHub | 39* | 217 | 256 |
| Walney 1 + 2 | 161* | 227 | 388 |
| Walney Extension 3 + 4 | 4,169* | 1,927 | 6,096 |
| West Duddon Sands | 1,321* | 166 | 1,487 |
| West of Orkney | 4,861* | 4,275 | 9,136 |
| White Cross | 3,304* | 1,059 | 4,363 |
| Arklow | 9,010 | 3,991 | 13,001 |
| Oriel | 820 | 2,670 | 3,490 |
| Dublin Array | 18,687 | 2,063 | 20,750 |
| Codling | 3,624 | 13,340 | 16,964 |
| Total (without the proposed development) | 32,141 | 94,564 | 126,705 |
| The proposed development (site-specific approach to bio-seasons) | 988 | 21,074 | 22,061 |
| The proposed development (Furness approach to bio-seasons) | 16,318 | 18,766 | 35,084 |

| Project | Breeding season cumulative abundance | Non-breeding season cumulative abundance | Annual total cumulative abundance |
|--|--------------------------------------|--|-----------------------------------|
| Total (with the proposed development) – site-specific approach to bio-seasons | 33,128 | 115,638 | 148,766 |
| Total (with the proposed development) - Furness approach to bio-seasons | 48,459 | 113,330 | 161,789 |

To note * indicates impacts that were not included into the breeding season total as these projects are outside the mean max foraging range (Woodward *et al.*, 2019). See NatureScot Guidance Note 3 for further clarity (NatureScot, 2023e).

During the breeding season, the cumulative mean peak abundance for guillemot is 33,128 individuals. Based on 50% displacement and 1% mortality, 166 (165.6) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 190,073 individuals (Table A15.7) and a baseline mortality of 26,800 individuals per annum (based on an average mortality rate of 0.141; Table A15.8), the addition of 166 cumulative displacement consequent mortalities would represent a 0.620% increase in baseline mortality. Potential cumulative impacts based on 60% displacement and 3% to 5% mortality are presented in Table A15.63.

During the non-breeding bio-season, the cumulative mean peak abundance for guillemot is 115,638 individuals within the array area plus 2km buffer. Based on 50% displacement and 1% mortality, 578 (578.2) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a non-breeding bio-season regional population size of 1,332,623 individuals (Table A15.7) and a baseline mortality of 187,900 individuals per annum (based on an average mortality rate of 0.141; Table A15.7), the addition of 578 cumulative displacement consequent mortalities would represent a 0.309% increase in baseline mortality. Potential cumulative impacts based on 60% displacement and 1% and 3% mortality and based on the Furness approach to bio-seasons are presented in Table A15.63.

The cumulative annual total abundance of guillemot is 148,766 individuals. Based on 50% displacement and 1% mortality, 744 (743.8) individuals are predicted to be at risk of displacement consequent mortality per annum, of which the proposed development contributes 110 (110.3) individuals.

Based on the largest regional population size of 1,332,623 individuals (Table A15.7) and a baseline mortality of 187,900 individuals per annum (based on an average mortality rate of 0.141; Table A15.8), the addition of 744 cumulative displacement consequent mortalities would represent a 0.397% increase in baseline mortality. Considering the biogeographic population size of 4,125,000, with a baseline mortality of 581,625 individuals per annum, the addition of 744 cumulative displacement consequent mortalities would represent a 0.128% increase in baseline mortality. Potential impacts based on the Guidance Approach to displacement and mortality rates are presented in Table A15.63.

For the Guidance Approach displacement and mortality rates the percentage increase in baseline mortality at the breeding, non-breeding and regional level exceeds 1%. As such further consideration is given in the form of PVA. Full details of the PVA analysis are provided in the Appendix A15.6: Offshore Ornithology Population Viability Analysis.

Results of the PVA are presented in Table A15.64 below. Metrics used for the interpretation of PVA outputs are the CGR and CPS values. The cumulative breeding total mortalities are for the NatureScot low and high approach are between 70 and 117 individuals per annum, resulting in a CGR and CPS between 0.998 to 0.997 and 0.944 to 0.908. Over the 35-year timeframe, this represents a 0.160% to 0.268% reduction in annual growth rate. This level of change would be indistinguishable from natural fluctuations in growth rates, as seabird populations commonly exhibit substantial interannual fluctuations in survival, productivity, and breeding success driven by environmental variability and extreme events far larger than the 0.27% change predicted here. As such, the modelled reduction falls well within the envelope of natural demographic variability and would not be detectable against background noise in population dynamics.

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement for tier 1 projects would be low (Table 15.7 of the 2024 EIAR).

Significance of the effect

Overall, it is predicted that the sensitivity of guillemot to disturbance and displacement during operation is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is low. The medium sensitivity and low magnitude of the impact on guillemot results in a slight cumulative effect for Project Option 1 and Project Option 2, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.63 Predicted cumulative annual displacement impacts on guillemot from the proposed development during the operational phase for all tier projects

| Bio-season (months) | Cumulative mean peak abundance (PFI plus 2km buffer) | Estimated mortality | | | Percentage increase in baseline mortality | | |
|--|--|--------------------------------|---------------------------------------|---------------------------------------|---|---------------------------------------|---------------------------------------|
| | | 50% displacement, 1% mortality | 60% displacement, 1% and 3% mortality | 60% displacement, 3% and 5% mortality | 50% displacement, 1% mortality | 60% displacement, 1% and 3% mortality | 60% displacement, 3% and 5% mortality |
| Furness approach to bio-seasons | | | | | | | |
| Breeding | 48,459 | 242.3 | 872.3 | 1,453.8 | 0.907% | 3.266% | 5.444% |
| Non - breeding | 113,330 | 566.7 | 680.0 | 2,039.9 | 0.303% | 0.363% | 1.089% |
| Annual (regional population) | 161,789 | 808.9 | 1,552.2 | 3,493.7 | 0.432% | 0.829% | 1.866% |
| Annual (biogeographic) | 161,789 | 808.9 | 1,552.2 | 3,493.7 | 0.140% | 0.268% | 0.603% |
| Site-specific approach to bio-seasons | | | | | | | |
| Breeding | 33,128 | 165.6 | 596.3 | 993.8 | 0.620% | 2.233% | 3.721% |
| Non - breeding | 115,638 | 578.2 | 693.8 | 2,081.5 | 0.309% | 0.371% | 1.112% |
| Annual (regional population) | 148,766 | 743.8 | 1,290.1 | 3,075.3 | 0.397% | 0.689% | 1.642% |
| Annual (biogeographic) | 148,766 | 743.8 | 1,290.1 | 3,075.3 | 0.128% | 0.223% | 0.531% |

Table A15.64 PVA results for guillemot using the Site-specific approach to bio-seasons for the proposed development alone and cumulatively

| Bio-season | Scenario | Mortalities (per annum) | CGR | CPS |
|-------------------|---|-------------------------|-------|-------|
| Breeding | Proposed development alone (Developer Approach) | 4.9 | 1.000 | 0.999 |
| | Proposed development alone (NatureScot low approach) | 17.8 | 1.000 | 0.996 |
| | Proposed development alone (NatureScot high approach) | 29.6 | 1.000 | 0.994 |
| | Cumulative (Developer Approach) | 165.6 | 0.999 | 0.965 |
| | Cumulative (NatureScot low approach) | 596.3 | 0.996 | 0.881 |
| | Cumulative (NatureScot high approach) | 993.8 | 0.994 | 0.809 |
| Non-breeding | Proposed development alone (Developer Approach) | 105.4 | 1.000 | 0.997 |
| | Proposed development alone (NatureScot low approach) | 126.4 | 1.000 | 0.996 |
| | Proposed development alone (NatureScot high approach) | 379.3 | 1.000 | 0.989 |
| | Cumulative (Developer Approach) | 578.2 | 1.000 | 0.983 |
| | Cumulative (NatureScot low approach) | 693.8 | 0.999 | 0.979 |
| | Cumulative (NatureScot high approach) | 2,081.5 | 0.998 | 0.939 |
| Annual (regional) | Proposed development alone (Developer Approach) | 110.3 | 1.000 | 0.997 |
| | Proposed development alone (NatureScot low approach) | 144.2 | 1.000 | 0.996 |
| | Proposed development alone (NatureScot high approach) | 409.0 | 1.000 | 0.988 |
| | Cumulative (Developer Approach) | 743.8 | 0.999 | 0.978 |
| | Cumulative (NatureScot low approach) | 1,290.1 | 0.999 | 0.961 |
| | Cumulative (NatureScot high approach) | 3,075.3 | 0.997 | 0.911 |

Table A15.65 PVA results for guillemot using the Furness approach to bio-seasons for the proposed development alone and cumulatively

| Bio-season | Scenario | Mortalities (per annum) | CGR | CPS |
|-------------------|---|-------------------------|-------|-------|
| Breeding | Proposed development alone (Developer Approach) | 81.6 | 1.000 | 0.983 |
| | Proposed development alone (NatureScot low approach) | 293.7 | 0.998 | 0.939 |
| | Proposed development alone (NatureScot high approach) | 489.5 | 0.997 | 0.901 |
| | Cumulative (Developer Approach) | 242.3 | 0.999 | 0.949 |
| | Cumulative (NatureScot low approach) | 872.3 | 0.995 | 0.830 |
| | Cumulative (NatureScot high approach) | 1,453.8 | 0.991 | 0.733 |
| Non-breeding | Proposed development alone (Developer Approach) | 93.8 | 1.000 | 0.997 |
| | Proposed development alone (NatureScot low approach) | 112.6 | 1.000 | 0.997 |
| | Proposed development alone (NatureScot high approach) | 337.8 | 1.000 | 0.990 |
| | Cumulative (Developer Approach) | 566.7 | 1.000 | 0.983 |
| | Cumulative (NatureScot low approach) | 680.0 | 0.999 | 0.980 |
| | Cumulative (NatureScot high approach) | 2,039.9 | 0.998 | 0.940 |
| Annual (regional) | Proposed development alone (Developer Approach) | 175.4 | 1.000 | 0.995 |
| | Proposed development alone (NatureScot low approach) | 406.3 | 1.000 | 0.988 |
| | Proposed development alone (NatureScot high approach) | 631.5 | 0.999 | 0.981 |
| | Cumulative (Developer Approach) | 827.3 | 0.999 | 0.975 |
| | Cumulative (NatureScot low approach) | 1,552.2 | 0.999 | 0.954 |
| | Cumulative (NatureScot high approach) | 3,493.7 | 0.997 | 0.899 |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for guillemot.

Tier 1, 2 and 3

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for guillemot.

15.9.6.2 Razorbill

Sensitivity of razorbill

As outlined in Section 15.5, razorbill have an overall sensitivity of medium, and are assessed using a displacement rate of 50% and a mortality rate of 1%, with a displacement rate of 60% displacement and a mortality rate range of 1% to 3% (non-breeding) and 3% to 5% (breeding) mortality also presented.

As outlined in Table A15.6 two bio-season approaches are considered for razorbill, with a more ecologically relevant site-specific Approach forming the main basis of the assessment, and results based on the Furness approach used for other species also presented.

Tier 1

Magnitude of impact

The estimated annual mean peak abundance of razorbill from relevant projects is presented in Table A15.66 below.

Table A15.66 Razorbill cumulative abundance totals for Tier 1 projects

| Project | Spring Migration | Breeding | Autumn Migration | Migration-free winter | Annual total abundance |
|----------------------|-------------------------|-----------------|-------------------------|------------------------------|-------------------------------|
| Awel y Mor | 336 | 140* | 66 | 150 | 692 |
| Barrow | 3 | 1* | 2 | 2 | 8 |
| Burbo Bank | 10 | 3* | 6 | 9 | 28 |
| Burbo Bank Extension | Not applicable | 64* | Not applicable | 29 | 93 |
| Erebus Floating Demo | 896 | 194* | 1,708 | 1,069 | 3,867 |
| Gwynt y Mor | 39 | 12* | 22 | 32 | 105 |
| Llyr 1 | 257 | 21* | 1,888 | 493 | 2,659 |
| Mona | 1,924 | 83* | 91 | 421 | 2,519 |
| Mooir Vannin | 1,194 | 76* | 653 | 214 | 2,136 |
| Morecambe | 382 | 252* | 694 | 651 | 1,979 |
| Morgan | 328 | 35 | 254 | 1,170 | 1,787 |
| North Hoyle | 11 | 3* | 6 | 9 | 29 |
| Ormonde | 10 | 174* | 6 | 8 | 198 |
| Robin Rigg | 15 | 63* | 11 | 14 | 103 |

| Project | Spring Migration | Breeding | Autumn Migration | Migration-free winter | Annual total abundance |
|--|------------------|--------------|------------------|-----------------------|------------------------|
| Rhyl Flats | 12 | 4* | 7 | 10 | 33 |
| Twin Hub | Unknown | 12* | Unknown | 53 | 65 |
| Walney 1 + 2 | 40 | 12* | 25 | 34 | 111 |
| Walney Extension 3 + 4 | 0 | 76* | 874 | 3,066 | 4,016 |
| West Duddon Sands | Unknown | Unknown* | Unknown | 202 | 202 |
| West of Orkney | 97 | 70* | 144 | 15 | 326 |
| White Cross | 345 | 40* | 40 | 361 | 786 |
| Arklow | 3,341 | 488 | 2,570 | 2,558 | 8,957 |
| Oriel | 859 | 353 | 962 | 512 | 2,686 |
| Dublin | 478 | 1,068 | 2,070 | 281 | 3,897 |
| Codling | 409 | 675 | 4,360 | 640 | 6,084 |
| Total (without the proposed development) | 10,986 | 2,778 | 16,459 | 12,003 | 28,997 |
| The proposed development (site-specific approach to bio-seasons) | 915 | 175 | 4,896 | 1,225 | 7,211 |
| The proposed development (Furness approach to bio-seasons) | 915 | 1,110 | 4,896 | 1,225 | 8,146 |
| Total (with the proposed development) – site-specific approach to bio-seasons | 11,901 | 2,953 | 21,355 | 13,228 | 49,437 |
| Total (with the proposed development) - Furness approach to bio-seasons | 11,901 | 3,887 | 21,355 | 13,228 | 50,371 |

To note * indicates impacts that were not included into the breeding season total as these projects are outside the mean max foraging range (Woodward *et al.*, 2019). See NatureScot Guidance Note 3 for further clarity (NatureScot, 2023e).

During the breeding season, the cumulative mean peak abundance for razorbill is 2,953 individuals. Based on 50% displacement and 1% mortality, 15 (14.8) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 49,298 individuals (Table A15.7) and a baseline mortality of 6,359 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of 15 cumulative displacement consequent mortalities would represent a 0.231% increase in

baseline mortality. Potential cumulative impacts based on 60% displacement and 3% and 5% mortality are presented in Table A15.67.

During the spring migration bio-season, the cumulative mean peak abundance for razorbill is 21,355 individuals within the array area plus 2km buffer. Based on 50% displacement and 1% mortality, 60 (59.5) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a spring migration bio-season regional population size of 632,453 individuals (Table A15.7) and a baseline mortality of 81,586 individuals per annum (based on an average mortality rate of 0.130; Table A15.7), the addition of 60 cumulative displacement consequent mortalities would represent a 0.072% increase in baseline mortality. Potential cumulative impacts based on 60% displacement and 1% and 3% mortality and based on the Furness approach to bio-seasons are presented in Table A15.67.

During the autumn migration bio-season, the cumulative mean peak abundance for razorbill is 11,901 individuals within the array area plus 2km buffer. Based on 50% displacement and 1% mortality, 107 (106.8) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a autumn migration bio-season regional population size of 632,453 individuals (Table A15.7) and a baseline mortality of 81,586 individuals per annum (based on an average mortality rate of 0.130; Table A15.7), the addition of 107 cumulative displacement consequent mortalities would represent a 0.130% increase in baseline mortality. Potential cumulative impacts based on 60% displacement and 1% and 3% mortality and based on the Furness approach to bio-seasons are presented in Table A15.67.

During the migration-free winter, the cumulative mean peak abundance for razorbill is 13,228 individuals within the array area plus 2km buffer. Based on 50% displacement and 1% mortality, 66 (66.1) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a migration-free winter bio-season regional population size of 366,961 individuals (Table A15.7) and a baseline mortality of 47,338 individuals per annum (based on an average mortality rate of 0.130; Table A15.7), the addition of 66 cumulative displacement consequent mortalities would represent a 0.136% increase in baseline mortality. Potential cumulative impacts based on 60% displacement and 1% and 3% mortality and based on the Furness approach to bio-seasons are presented in Table A15.67.

The cumulative annual total abundance of razorbill is 49,437 individuals. Based on 50% displacement and 1% mortality, 247 (247.2) individuals are predicted to be at risk of displacement consequent mortality per annum, of which the proposed development contributes less than one (0.2) individuals.

Based on the largest regional population size of 632,453 individuals (Table A15.7) and a baseline mortality of 81,586 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of 247 cumulative displacement consequent mortalities would represent a 0.300% increase in baseline mortality. Considering the biogeographic population size of 1,707,000, with a baseline mortality of 222,251 individuals per annum, the addition of 247 cumulative displacement consequent mortalities would represent a 0.111% increase in baseline mortality. Potential impacts based on the Guidance Approach to displacement and mortality rates are presented in Table A15.67.

For the Developer Approach to displacement and mortality rates, the cumulative impacts for each bio-season represents a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect). However, under the Guidance Approach, the displacement and mortality rates applied during the breeding season result in a percentage increase in baseline mortality at both the breeding and regional population levels that exceeds 1%. Therefore, further assessment is required in the form of a PVA. Full details of the PVA analysis are provided in Appendix A15.6: Offshore Ornithology Population Viability Analysis.

Results of the PVA are presented in Table A15.68 below. Metrics used for the interpretation of PVA outputs are the CGR and CPS values. The cumulative breeding total mortalities are for the NatureScot low and high approach are between 53 (53.1) and 89 (88.6) individuals per annum, resulting in a CGR and CPS between 1.000 to 1.000 and 0.994 to 0.990. Over the 35-year timeframe, this represents a 0.017% and 0.028% reduction in annual growth rate compared to an unimpacted population.

The annual total mortalities the NatureScot low and high approach are predicted to be between 332 (332.1) and 925 (925.3) individuals per annum, resulting in a CGR and CPS of 0.999 to 0.998 and 0.979 to 0.942,

respectively. Over the 35-year timeframe, this represents a 0.060% and 0.167% reduction in annual growth rate. These impacts are considered to be sufficiently small that they would be indistinguishable from natural fluctuations in the population, regardless of current population trend.

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement for Tier 1 projects would be medium. However, based on PVA analysis the overall magnitude is considered to be low (Table 15.7 of the 2024 EIAR).

Significance of the effect

Overall, it is predicted that the sensitivity of razorbill to disturbance and displacement during operation is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is low. The medium sensitivity and low magnitude of the impact on razorbill results in a slight cumulative effect for Project Option 1 and Project Option 2, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.67 Predicted cumulative annual displacement impacts on razorbill from the proposed development during the operational phase for all tier projects

| Bio-season (months) | Cumulative mean peak abundance (PFI plus 2km buffer) | Estimated mortality | | | Percentage increase in baseline mortality | | |
|--|--|--------------------------------|---------------------------------------|---------------------------------------|---|---------------------------------------|---------------------------------------|
| | | 50% displacement, 1% mortality | 60% displacement, 1% and 3% mortality | 60% displacement, 3% and 5% mortality | 50% displacement, 1% mortality | 60% displacement, 1% and 3% mortality | 60% displacement, 3% and 5% mortality |
| Furness approach to bio-seasons | | | | | | | |
| Autumn migration | 21,355 | 106.8 | 128.1 | 384.4 | 0.130% | 0.156% | 0.467% |
| Breeding | 3,887 | 19.4 | 70.0 | 116.6 | 0.302% | 1.091% | 1.817% |
| Spring migration | 13,228 | 66.1 | 79.4 | 238.1 | 0.138% | 0.166% | 0.498% |
| Migration-free winter | 11,901 | 59.5 | 71.4 | 214.2 | 0.072% | 0.087% | 0.260% |
| Annual (regional population) | 50,371 | 251.9 | 348.9 | 953.3 | 0.306% | 0.424% | 1.158% |
| Annual (biogeographic) | 50,371 | 251.9 | 348.9 | 953.3 | 0.113% | 0.157% | 0.429% |
| Site-specific approach to bio-seasons | | | | | | | |
| Autumn migration | 21,355 | 106.8 | 128.1 | 384.4 | 0.130% | 0.156% | 0.467% |
| Breeding | 2,953 | 14.8 | 53.1 | 88.6 | 0.231% | 0.827% | 1.380% |
| Spring migration | 13,228 | 66.1 | 79.4 | 238.1 | 0.138% | 0.166% | 0.498% |
| Migration-free winter | 11,901 | 59.5 | 71.4 | 214.2 | 0.072% | 0.087% | 0.260% |
| Annual (regional population) | 49,437 | 247.2 | 332.1 | 925.3 | 0.300% | 0.403% | 1.124% |
| Annual (biogeographic) | 49,437 | 247.2 | 332.1 | 925.3 | 0.111% | 0.149% | 0.416% |

Table A15.68 PVA results for razorbill for the proposed development alone and cumulatively

| Bio-season | Scenario | Mortalities (per annum) | CGR | CPS |
|---|---|-------------------------|-------|-------|
| Furness approach to bio-seasons for proposed development | | | | |
| Breeding season | Proposed development alone (Developer Approach) | 5.50 | 1.000 | 0.996 |
| | Proposed development alone (NatureScot low approach) | 20.00 | 1.000 | 0.983 |
| | Proposed development alone (NatureScot high approach) | 33.30 | 0.999 | 0.973 |
| | Cumulative (Developer Approach) | 19.40 | 1.000 | 0.984 |
| | Cumulative (NatureScot low approach) | 70.00 | 0.998 | 0.944 |
| | Cumulative (NatureScot high approach) | 116.60 | 0.997 | 0.908 |
| Annual (regional) | Proposed development alone (Developer Approach) | 40.7 | 1.000 | 0.997 |
| | Proposed development alone (NatureScot low approach) | 62.2 | 1.000 | 0.996 |
| | Proposed development alone (NatureScot high approach) | 159.9 | 1.000 | 0.990 |
| | Cumulative (Developer Approach) | 251.9 | 1.000 | 0.984 |
| | Cumulative (NatureScot low approach) | 348.9 | 0.999 | 0.978 |
| | Cumulative (NatureScot high approach) | 953.3 | 0.998 | 0.940 |
| Site-specific approach to bio-seasons for proposed development | | | | |
| Breeding season | Proposed development alone (Developer Approach) | 0.90 | 1.000 | 1.000 |
| | Proposed development alone (NatureScot low approach) | 3.20 | 1.000 | 1.000 |
| | Proposed development alone (NatureScot high approach) | 5.30 | 1.000 | 0.999 |

| Bio-season | Scenario | Mortalities (per annum) | CGR | CPS |
|-------------------|---|-------------------------|-------|-------|
| | Cumulative (Developer Approach) | 14.80 | 1.000 | 0.998 |
| | Cumulative (NatureScot low approach) | 53.10 | 1.000 | 0.994 |
| | Cumulative (NatureScot high approach) | 88.60 | 1.000 | 0.990 |
| Annual (regional) | Proposed development alone (Developer Approach) | 36.10 | 1.000 | 0.998 |
| | Proposed development alone (NatureScot low approach) | 45.40 | 1.000 | 0.997 |
| | Proposed development alone (NatureScot high approach) | 131.90 | 1.000 | 0.991 |
| | Cumulative (Developer Approach) | 247.20 | 1.000 | 0.984 |
| | Cumulative (NatureScot low approach) | 332.10 | 0.999 | 0.979 |
| | Cumulative (NatureScot high approach) | 925.30 | 0.998 | 0.942 |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for razorbill.

Tier 1, 2 and 3 (All Projects)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for razorbill.

15.9.6.3 Puffin

Sensitivity of puffin

As outlined in Section 15.5, puffin have an overall sensitivity of medium, and are assessed using a displacement rate of 50% and a mortality rate of 1%, with a displacement rate of 60% and a mortality rate range of 1% to 3% (non-breeding) and 3% to 5% (breeding) also presented.

Tier 1

Magnitude of impact

The estimated annual mean peak abundance of puffin from relevant projects in the array area plus 2km buffer is presented in Table A15.69 below. It should be noted that for the Burbo Bank Extension and Walney Extension projects, data was only provided within the 4km buffer. The total mean peak abundance is therefore an overestimate of actual mean peak abundance across the projects and is considered a precautionary approach.

Table A15.69 Puffin cumulative abundance totals for Tier 1 projects

| Project | Breeding | Non-breeding | Annual total cumulative abundance |
|------------------------|----------|--------------|-----------------------------------|
| Awel-y-Mor | 8 | 0 | 8 |
| Barrow | 1 | 0 | 1 |
| Burbo Bank | <1 | <1 | <1 |
| Burbo Bank Extension | 10 | 0 | 10 |
| Erebus Floating Demo | 1,416 | 160 | 1576 |
| Gwynt-y-Mor | 2 | 1 | 3 |
| Llyr 1 | 152 | 592 | 744 |
| Mona | 15 | 22 | 37 |
| Mooir Vannin | 88 | 12 | 100 |
| Morecambe | 39 | 20 | 59 |
| Morgan | 9 | 5 | 14 |
| North Hoyle | 0 | 0 | 0 |
| Ormonde | 1 | 0 | 1 |
| Robin Rigg | 0 | 0 | 0 |
| Rhyl Flats | <1 | <1 | 1 |
| Twin Hub | 0* | 0 | 0 |
| Walney 1 + 2 | 3 | 2 | 5 |
| Walney Extension 3 + 4 | 53 | 119 | 172 |
| West Duddon Sands | 61 | 35 | 96 |

| Project | Breeding | Non-breeding | Annual total cumulative abundance |
|---|--------------|--------------|-----------------------------------|
| West of Orkney | 5,272* | 1,177 | 6449 |
| White Cross | 49* | 31 | 80 |
| Arklow | 18 | 20 | 38 |
| Oriel | 0 | 0 | 0 |
| Dublin | 0 | 0 | 0 |
| Codling | 94 | 106 | 200 |
| Total (without the proposed development) | 1,969 | 2,303 | 4,272 |
| The proposed development | 17 | 14 | 31 |
| Total (with the proposed development) | 1,987 | 2,317 | 4,304 |

To note * indicates impacts that were not included into the breeding season total as these projects are outside the mean max foraging range (Woodward *et al.*, 2019). See NatureScot Guidance Note 3 for further clarity (NatureScot, 2023e).

During the breeding season, the cumulative mean peak abundance for puffin is 1,987 individuals within the array area plus 2km buffer. Based on 50% displacement and 1% mortality, ten (9.9) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 79,939 individuals (Table A15.7) and a baseline mortality of 9,513 individuals per annum (based on an average mortality rate of 0.119; Table A15.8), the addition of ten cumulative displacement consequent mortalities would represent a 0.104% increase in baseline mortality. Potential cumulative impacts based on 60% displacement and 3% to 5% mortality are presented in Table A15.70.

During the non-breeding bio-season, the cumulative mean peak abundance for puffin is 2,317 individuals within the array area plus 2km buffer. Based on 50% displacement and 1% mortality, 12 (11.6) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a non-breeding bio-season regional population size of 300,427 individuals (Table A15.7) and a baseline mortality of 35,751 individuals per annum (based on an average mortality rate of 0.119; Table A15.7), the addition of 12 cumulative displacement consequent mortalities would represent a 0.032% increase in baseline mortality. Potential cumulative impacts based on 60% displacement and 1% and 3% mortality and based on the Furness approach to bio-seasons are presented in Table A15.70.

The cumulative annual total abundance of puffin is 4,304 individuals. Based on 50% displacement and 1% mortality, 22 (21.5) individuals are predicted to be at risk of displacement consequent mortality per annum, of which the proposed development contributes less than one (0.2) individuals.

Based on the largest regional population size of 300,427 individuals (Table A15.7) and a baseline mortality of 35,751 individuals per annum (based on an average mortality rate of 0.119; Table A15.8), the addition of 22 cumulative displacement consequent mortalities would represent a 0.060% increase in baseline mortality. Considering the biogeographic population size of 11,840,000, with a baseline mortality of 1,408,960 individuals per annum, the addition of 22 cumulative displacement consequent mortalities would represent a 0.002% increase in baseline mortality. Potential impacts based on the Guidance Approach to displacement and mortality rates are presented in Table A15.70.

At both the regional population and biogeographic population scales, the cumulative impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement for tier 1 projects would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect

Overall, it is predicted that the sensitivity of puffin to disturbance and displacement during operation is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is negligible. The medium sensitivity and negligible magnitude of the impact on puffin results in an imperceptible cumulative effect for Project Option 1 and Project Option 2, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.70 Predicted cumulative annual displacement impacts on puffin from the proposed development during the operational phase for all tier projects

| Bio-season (months) | Cumulative mean peak abundance (PFI plus 2km buffer) | Estimated mortality | | | Percentage increase in baseline mortality | | |
|------------------------------|--|--------------------------------|---------------------------------------|---------------------------------------|---|---------------------------------------|---------------------------------------|
| | | 50% displacement, 1% mortality | 60% displacement, 1% and 3% mortality | 60% displacement, 3% and 5% mortality | 50% displacement, 1% mortality | 60% displacement, 1% and 3% mortality | 60% displacement, 3% and 5% mortality |
| Breeding | 1,987 | 9.9 | 35.8 | 59.6 | 0.104% | 0.376% | 0.627% |
| Non-breeding | 2,317 | 11.6 | 13.9 | 41.7 | 0.032% | 0.039% | 0.117% |
| Annual (regional population) | 4,304 | 21.5 | 49.7 | 101.3 | 0.060% | 0.139% | 0.283% |
| Annual (biogeographic) | 4,304 | 21.5 | 49.7 | 101.3 | 0.002% | 0.004% | 0.007% |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for puffin.

Tier 1, 2 and 3 (All Projects)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for puffin.

15.9.6.4 Manx shearwater

Sensitivity of Manx shearwater

As outlined in Section 15.5, Manx shearwater have an overall sensitivity of medium, and are assessed using a displacement rate of 10% and a mortality rate of 1%.

Tier 1

Magnitude of impact

The estimated annual mean peak abundance of Manx shearwater from relevant projects in their array area plus 2km buffer is presented in Table A 15.71 below. It should be noted that for the Burbo Bank Extension and Walney Extension projects, data was only provided within the 4km buffer.

Table A 15.71 Manx shearwater cumulative abundance totals for Tier 1 projects

| Project | Spring Migration | Breeding | Autumn Migration | Annual total cumulative abundance |
|----------------------|-------------------------|-----------------|-------------------------|--|
| Awel-y-Mor | 177 | 26 | 214 | 417 |
| Barrow | 0 | 2 | 0 | 2 |
| Burbo Bank | 0 | 2 | 1 | 3 |
| Burbo Bank Extension | 0 | 443 | 1 | 444 |
| Erebus Floating Demo | 18 | 1,540 | 557 | 2,115 |
| Gwynt-y-Mor | 1 | 13 | 3 | 17 |
| Llyr 1 | 1,267 | 3,434 | 27 | 4,728 |
| Mona | 3 | 1,249 | 16 | 1,268 |
| Mooir Vannin | 0 | 1,401 | 31 | 1,431 |
| Morecambe | 1,617 | 4,705 | 2,650 | 8,972 |
| Morgan | 0 | 1,254 | 384 | 1,638 |
| North Hoyle | 0 | 2 | 0 | 2 |
| Ormonde | Unknown | 1,001 | Unknown | 1,001 |
| Robin Rigg | 0 | 3 | 1 | 4 |
| Rhyl Flats | 0 | 4 | 1 | 5 |
| Twin Hub | Unknown | 1,270 | 3 | 1,273 |

| Project | Spring Migration | Breeding | Autumn Migration | Annual total cumulative abundance |
|---|------------------|---------------|------------------|-----------------------------------|
| Walney 1 + 2 | 1 | 14 | 4 | 19 |
| Walney Extension 3 + 4 | Unknown | 588 | 324 | 912 |
| West Duddon Sands | 1 | 544 | 3 | 548 |
| West of Orkney | 0 | 8 | 3 | 11 |
| White Cross | 12,126 | 33 | 22 | 12,181 |
| Arklow | 0 | 0 | 0 | 0 |
| Oriel | 0 | 690 | 517 | 1,207 |
| Dublin Array | 4 | 2,198 | 176 | 2,378 |
| Codling | 780 | 180 | 1,125 | 2,086 |
| Total (without the proposed development) | 15,995 | 20,604 | 6,063 | 42,662 |
| The proposed development | 0 | 3,975 | 458 | 4,433 |
| Total (with the proposed development) | 15,995 | 24,579 | 6,521 | 47,095 |

During the breeding season, the cumulative abundance for Manx shearwater is 24,579 individuals within the array area plus 2km buffer. Based on 10% displacement and 1 mortality, 25 (24.6) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 2,121,049 individuals (Table A15.7) and a baseline mortality of 275,736 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of 25 cumulative displacement consequent mortalities would represent a 0.003% increase in baseline mortality.

During the spring migration bio-season, the cumulative abundance for Manx shearwater is 15,995 individuals within the array area plus 2km buffer. Based on 10% displacement and 1% mortality, 16 (16.0) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a spring migration bio-season regional population size of 1,585,521 individuals (Table A15.7) and a baseline mortality of 206,118 individuals per annum (based on an average mortality rate of 0.130; Table A15.7), the addition of 16 cumulative displacement consequent mortalities would represent a 0.008% increase in baseline mortality.

During the autumn migration bio-season, the cumulative abundance for Manx shearwater is 16,521 individuals within the array area plus 2km buffer. Based on 10% displacement and 1% mortality, seven (6.5) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on an autumn migration bio-season regional population size of 1,585,521 individuals (Table A15.7) and a baseline mortality of 206,118 individuals per annum (based on an average mortality rate of 0.130; Table A15.7), the addition of seven cumulative displacement consequent mortalities would represent a 0.003% increase in baseline mortality.

The cumulative annual total abundance of Manx shearwater is 47,095 individuals. Based on 10% displacement and 1% mortality, 47 (47.1) individuals are predicted to be at risk of displacement consequent mortality per annum, of which the proposed development contributes four (4.4) individuals.

Based on the largest regional population size of 1,585,521 individuals (Table A15.7) and a baseline mortality of 206,118 individuals per annum (based on an average mortality rate of 0.130; Table A15.8), the addition of 47 cumulative displacement consequent mortalities would represent a 0.023% increase in baseline mortality. Considering the biogeographic population size of 2,000,000, with a baseline mortality of 260,000 individuals per annum, the addition of 47 cumulative displacement consequent mortalities would represent a 0.018% increase in baseline mortality.

At both the regional population and biogeographic population scales, the cumulative impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement for tier 1 and 2 projects would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect

Overall, it is predicted that the sensitivity of Manx shearwater to disturbance and displacement during operation is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is negligible. The medium sensitivity and negligible magnitude of the impact on Manx shearwater results in an imperceptible cumulative effect for Project Option 1 and Project Option 2, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.72 Predicted cumulative annual displacement impacts on Manx shearwater from the proposed development during the operational phase for all project tiers

| Bio-season (months) | Cumulative mean peak abundance (PFI plus 2km buffer) | Estimated mortality | Percentage increase in baseline mortality |
|------------------------------|--|--------------------------------|---|
| | | 10% displacement, 1% mortality | 10% displacement, 1% mortality |
| Autumn migration | 6,521 | 6.5 | 0.003% |
| Breeding | 24,579 | 24.6 | 0.009% |
| Spring migration | 15,995 | 16.0 | 0.008% |
| Annual (regional population) | 47,095 | 47.1 | 0.023% |
| Annual (biogeographic) | 47,095 | 47.1 | 0.018% |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for Manx shearwater.

Tier 1, 2 and 3

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for Manx shearwater.

15.9.6.5 Gannet

Sensitivity of gannet

As outlined in Section 15.5, gannet have an overall sensitivity of medium, and are assessed using a displacement rate of 70% and a mortality rate of 1%, with a mortality rate range of 1% and 3% also presented.

Tier 1

Magnitude of impact

The estimated annual mean peak abundance of gannet from relevant projects in the array area plus 2km buffer is presented in Table A15.73 below. It should be noted that for the Burbo Bank Extension and Walney Extension projects, data was only provided within the 4km buffer. The total mean peak abundance is therefore an overestimate of actual mean peak abundance across the projects and is considered a precautionary approach.

Table A15.73 Gannet cumulative abundance totals for Tier 1 projects

| Project | Spring Migration | Breeding | Autumn Migration | Annual total cumulative abundance |
|----------------------|-------------------------|-----------------|-------------------------|--|
| Awel-y-Mor | 0 | 328 | 201 | 529 |
| Barrow | 3 | 8 | 6 | 17 |
| Burbo Bank | 3 | 6 | 5 | 14 |
| Burbo Bank Extension | 25 | 648 | 22 | 695 |
| Erebus Floating Demo | 100 | 224 | 334 | 658 |
| Gwynt-y-Mor | 13 | 27 | 20 | 60 |
| Llyr 1 | 65 | 246 | 715 | 1,026 |
| Mona | 28 | 251 | 58 | 337 |
| Mooir Vannin | 21 | 319 | 161 | 500 |
| Morecambe | 8 | 541 | 124 | 673 |
| Morgan | 35 | 154 | 65 | 254 |
| North Hoyle | 3 | 7 | 5 | 15 |
| Ormonde | 3 | 199 | 6 | 208 |
| Robin Rigg | 4 | 11 | 7 | 22 |
| Rhyl Flats | 4 | 8 | 6 | 18 |

| Project | Spring Migration | Breeding | Autumn Migration | Annual total cumulative abundance |
|---|------------------|--------------|------------------|-----------------------------------|
| Twin Hub | Unknown | 244 | 153 | 397 |
| Walney 1 | 15 | 36 | 26 | 77 |
| Walney 2 | 24 | 150 | 259 | 433 |
| Walney Extension 3 + 4 | 11 | 431 | 18 | 460 |
| West Duddon Sands | 59 | 958 | 1,171 | 2,188 |
| West of Orkney | 141 | 239* | 76 | 456 |
| White Cross | 30 | 72 | 43 | 145 |
| Arklow | 43 | 264 | 336 | 643 |
| Oriel | 27 | 700 | 21 | 748 |
| Dublin Array | 105 | 105 | 55 | 265 |
| Codling | 0 | 328 | 201 | 529 |
| Total (without the proposed development) | 769 | 5,217 | 3,893 | 9,880 |
| The proposed development | 9 | 270 | 135 | 414 |
| Total (with the proposed development) | 778 | 5,488 | 4,028 | 10,294 |

To note * indicates impacts that were not included into the breeding season total as these projects are outside the mean max foraging range (Woodward *et al.*, 2019). See NatureScot Guidance Note 3 for further clarity (NatureScot, 2023e).

During the breeding season, the cumulative breeding abundance for gannet is 5,488 individuals. Based on 70% displacement and 1% mortality, 38 (38.4) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 632,514 individuals (Table A15.7) and a baseline mortality of 118,027 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of 38 cumulative displacement consequent mortalities would represent a 0.033% increase in baseline mortality. Potential cumulative impacts based on 70% displacement and 3% mortality are presented in Table A15.74.

During the spring migration bio-season, the cumulative mean peak abundance for gannet is 778 individuals within array areas plus 2km buffer. Based on 70% displacement and 1% mortality, five (5.4) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a spring migration bio-season regional population size of 643,917 individuals (Table A15.7) and a baseline mortality of 120,155 individuals per annum (based on an average mortality rate of 0.187; Table A15.7), the addition of five cumulative displacement consequent mortalities would represent a 0.004% increase in baseline mortality. Potential cumulative impacts based on 70% displacement and 3% mortality are presented in Table A15.74.

During the autumn migration bio-season, the cumulative mean peak abundance for gannet is 4,028 individuals within the array area plus 2km buffer. Based on 70% displacement and 1% mortality, 28 (28.2) individuals are predicted to be at risk of cumulative displacement consequent mortality per annum.

Based on a autumn migration bio-season regional population size of 535,183 individuals (Table A15.7) and a baseline mortality of 99,865 cumulative displacement consequent mortalities would represent a 0.028% increase in baseline mortality. Potential cumulative impacts based on 70% displacement and 3% mortality are presented in Table A15.74.

The cumulative annual total abundance of gannet is 10,294 individuals. Based on 70% displacement and 1% mortality, 72 (72.1) individuals are predicted to be at risk of displacement consequent mortality per annum, of which the proposed development contributes three (2.9) individuals.

Based on the largest regional population size of 643,917 individuals (Table A15.7) and a baseline mortality of 120,155 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of 72 cumulative displacement consequent mortalities would represent a 0.060% increase in baseline mortality. Considering the biogeographic population size of 1,180,000, with a baseline mortality of 220,188 individuals per annum, the addition of 216 cumulative displacement consequent mortalities would represent a 0.033% increase in baseline mortality. Potential impacts based on 70% displacement and 3% mortality are presented in Table A15.74.

At both the regional population and biogeographic population scales, the cumulative impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement for tier 1 projects would be low (Table 15.7 of the 2024 EIAR).

Significance of the effect

Overall, it is predicted that the sensitivity of gannet to disturbance and displacement during operation is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is negligible. The medium sensitivity and negligible magnitude of the impact on gannet results in an imperceptible cumulative effect for Project Option 1 and Project Option 2, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.74 Predicted cumulative annual displacement impacts on gannet from the proposed development during the operational phase for all project tiers

| Bio-season (months) | Cumulative mean peak abundance (PFI plus 2km buffer) | Estimated mortality | | Percentage increase in baseline mortality | |
|------------------------------|--|--------------------------------|--------------------------------|---|--------------------------------|
| | | 70% displacement, 1% mortality | 70% displacement, 3% mortality | 70% displacement, 1% mortality | 70% displacement, 3% mortality |
| Autumn migration | 4,028 | 28.2 | 84.6 | 0.028% | 0.028% |
| Breeding | 5,488 | 38.4 | 115.2 | 0.033% | 0.033% |
| Spring migration | 778 | 5.4 | 16.3 | 0.004% | 0.004% |
| Annual (regional population) | 10,294 | 72.1 | 216.2 | 0.060% | 0.060% |
| Annual (biogeographic) | 10,294 | 72.1 | 216.2 | 0.033% | 0.033% |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for gannet.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for gannet.

15.9.6.6 Kittiwake

Sensitivity of kittiwake

As outlined in Section 15.5, kittiwake have an overall sensitivity of low, and are assessed using a displacement rate of 30% and a mortality rate of 1% to 3%.

As outlined in Table A15.6, two bio-season approaches are applied for kittiwake. The assessment is primarily based on the more ecologically appropriate project-specific approach, while results using the Furness bio-seasons (applied for other species) are also provided for comparison.

Tier 1

Magnitude of impact

The estimated annual mean peak abundance of kittiwake from relevant projects in the array area plus 2km buffer is presented in Table A15.75 below.

Magnitude of impact

The estimated annual mean peak abundance of kittiwake from relevant projects in the array area plus 2km buffer is presented in Table A15.75 below.

Table A15.75 Kittiwake cumulative abundance totals for Teir 1 projects

| Project | Spring Migration | Breeding | Autumn Migration | Annual total cumulative abundance |
|----------------------|-------------------------|-----------------|-------------------------|--|
| Arklow Bank Phase 1 | Unknown | Unknown | Unknown | 0 |
| Awel-y-Mor | 298 | 87 | 82 | 467 |
| Barrow | 23 | 20 | 21 | 64 |
| Burbo Bank | 22 | 14 | 20 | 56 |
| Burbo Bank Extension | 50 | 707 | 45 | 802 |
| Erebus Floating Demo | 2,022 | 2 | 508 | 2,532 |
| Gwynt-y-Mor | 72 | 51 | 65 | 188 |
| Llyr 1 | 206 | 88 | 1,944 | 2,238 |
| Mona | 574 | 726 | 560 | 1,860 |
| Moor Vannin | 992 | 572 | 551 | 2,115 |
| Morecambe | 76 | 1,729 | 1,717 | 3,522 |
| Morgan | 791 | 505 | 1,151 | 2,447 |

| Project | Spring Migration | Breeding | Autumn Migration | Annual total cumulative abundance |
|---|------------------|---------------|------------------|-----------------------------------|
| North Hoyle | 21 | 17 | 19 | 57 |
| Ormonde | 22 | 60 | 20 | 102 |
| Rhyl flats | 22 | 16 | 20 | 58 |
| Robin Rigg | 30 | 21 | 28 | 79 |
| Twin Hub | 56 | 4* | 189 | 249 |
| Walney 1 | 94 | 63 | 86 | 243 |
| Walney 2 | 1,467 | 319 | 1,114 | 2,900 |
| Walney Extension 3 + 4 | 68 | 454 | 62 | 584 |
| West Duddon Sands | 1,217 | 690 | 799 | 2,706 |
| West of Orkney | 698 | 44* | 172 | 914 |
| White Cross | 4,075 | 3,733 | 2,483 | 10,291 |
| Arklow Bank Phase 2 | 768 | 74 | 305 | 1,147 |
| Oriel | 850 | 622 | 749 | 2,221 |
| Dublin Array | 543 | 1,363 | 586 | 2,492 |
| Codling | 22 | 16 | 20 | 58 |
| Total (excluding the proposed development) | 15,057 | 11,287 | 13,296 | 39,640 |
| The proposed development (migration-free breeding bio-season) | 612 | 594 | 930 | 2,136 |
| The proposed development (full breeding bio-season) | 498 | 903 | 486 | 1,887 |
| Total (with the proposed development) - Developer migration-free breeding bio-season | 15,669 | 11,880 | 14,227 | 41,776 |
| Total (with the proposed development) - Developer full breeding bio-season | 15,555 | 12,190 | 13,782 | 41,527 |

To note * indicates impacts that were not included into the breeding season total as these projects are outside the mean max foraging range (Woodward *et al.*, 2019). See NatureScot Guidance Note 3 for further clarity (NatureScot, 2023e).

During the breeding bio-season, the cumulative mean peak abundance for kittiwake is 11,880 individuals. Based on 30% displacement and 1% and 3% mortality, between 36 (35.6) and 107 (106.9) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on a breeding bio-season regional population size of 142,464 individuals (Table A15.7) and a baseline mortality of 22,509 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of 36 to 107 displacement consequent mortalities would represent a 0.158% to 0.476% increase in baseline mortality.

During the autumn migration bio-season, the cumulative mean peak abundance for kittiwake is 14,227 individuals within the PFI plus 2km buffer. Based on 30% displacement and 1% and 3% mortality, between 43 (42.7) and 128 (128.0) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on autumn migration bio-season regional population size of 933,197 individuals (Table A15.7) and a baseline mortality of 147,165 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of 43 to 128 displacement consequent mortalities would represent a 0.029% to 0.087% increase in baseline mortality.

During the spring migration bio-season, the cumulative mean peak abundance for kittiwake is 15,669 individuals within the PFI plus 2km buffer. Based on 30% displacement and 1% and 3% mortality, between 47 (47.0) and 141 (141.0) individuals are predicted to be at risk of displacement consequent mortality per annum.

Based on spring migration bio-season regional population size of 713,137 individuals (Table A15.7) and a baseline mortality of 112,462 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of 47 to 141 displacement consequent mortality would represent a 0.042% to 0.125% increase in baseline mortality.

The cumulative annual total abundance of kittiwake is 41,776 individuals. Based on 30% displacement and 1% and 3% mortality, between 125 (125.3) and 376 (376.0) individuals are predicted to be at risk of displacement consequent mortality per annum, of which the proposed development contributes between six (6.4) and 19 (19.2) individuals.

Based on the largest regional population size of 933,197 individuals (Table A15.7) and a baseline mortality of 147,165 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of 125 to 376 displacement consequent mortalities would represent a 0.085% to 0.255% increase in baseline mortality. Considering the biogeographic population size of 1,180,000, with a baseline mortality of 804,270 individuals per annum, the addition of 125 to 376 displacement consequent mortalities would represent a 0.016% to 0.047% increase in baseline mortality.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of impact from Project Option 1 and Project Option 2 resulting from disturbance and displacement would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect (PFI)

Overall, it is predicted that the sensitivity of kittiwake to disturbance and displacement during operation is low and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is negligible. The low sensitivity and negligible magnitude of the impact on kittiwake results in an imperceptible cumulative effect for Project Option 1 and Project Option 2, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.76 Predicted cumulative annual displacement impacts on kittiwake from the proposed development during the operational phase for tier 1 projects.

| Bio-season (months) | Cumulative mean peak abundance (PFI plus 2km buffer) | Estimated mortality | | Percentage increase in baseline mortality | |
|--|--|--------------------------------|--------------------------------|---|--------------------------------|
| | | 30% displacement, 1% mortality | 30% displacement, 3% mortality | 30% displacement, 1% mortality | 30% displacement, 3% mortality |
| Furness approach to bio-seasons | | | | | |
| Autumn migration | 13,782.3 | 42.7 | 128.0 | 0.028% | 0.084% |
| Breeding | 12,189.5 | 36.6 | 109.7 | 0.163% | 0.488% |
| Spring migration | 15,555.0 | 46.7 | 140.0 | 0.042% | 0.124% |
| Annual (regional population) | 41,526.8 | 125.9 | 377.7 | 0.085% | 0.254% |
| Annual (biogeographic) | 41,526.8 | 125.9 | 377.7 | 0.015% | 0.046% |
| Site-specific approach to bio-seasons | | | | | |
| Autumn migration | 14,226.7 | 42.7 | 128.0 | 0.029% | 0.087% |
| Breeding | 11,880.3 | 35.6 | 106.9 | 0.158% | 0.476% |
| Spring migration | 15,668.7 | 47.0 | 141.0 | 0.042% | 0.125% |
| Annual (regional population) | 41,775.6 | 125.3 | 376.0 | 0.085% | 0.255% |
| Annual (biogeographic) | 41,775.6 | 125.3 | 376.0 | 0.016% | 0.047% |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for kittiwake.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for kittiwake.

15.9.7 Cumulative Impact 3: Collision risk

The cumulative collision risk assessment has been fully updated and now incorporates the revised project-alone assessment following the introduction of the PFI, the updated NWIS DAS dataset, and methodological updates arising from other RFI sections. For a summary of updates relevant to collision risk please see Section 15.5.3.2.

During the operation of the proposed development, there is potential for cumulative collision risk to birds with the proposed development and other developments through collision with WTGs and other associated infrastructure, resulting in injury or fatality. This may occur when birds fly through the array area of the proposed development and/or other developments in the area whilst foraging for food, commuting between breeding sites and foraging areas, or during migration.

For the cumulative collision risk assessment, only projects within Tier 1 were considered, with projects earlier in the planning process (Tiers 2 and 3) lacking publicly available impact estimates. Similarly, for older projects collision mortality data is often not broken down by bio-season, and therefore some project totals are provided as annual totals only.

For all OWFs, collision estimates were extracted from the projects' Environmental Statements.

15.9.7.1 Kittiwake

Sensitivity of kittiwake

As outlined in Section 15.5, kittiwake have an overall sensitivity of high.

Tier 1

Magnitude of impact

The predicted annual total number of birds subject to collision mortality as a result of the proposed development combined with other developments is presented in Table A15.77 below.

Table A15.77 Kittiwake cumulative collision mortality for all tier projects

| Project | Spring Migration | Breeding | Autumn Migration | Annual total collisions |
|------------------------|-------------------------|-----------------|-------------------------|--------------------------------|
| Awel-y-Mor | 15.3 | 11.7 | 8.3 | 35.3 |
| Gwynt-y-Mor | 6.8 | 11.8 | 10.8 | 29.4 |
| Rhyl Flats | 0.8 | 1.3 | 1.2 | 3.3 |
| Burbo Bank Extension | Unavailable | Unavailable | Unavailable | 23.0 |
| North Hoyle | 0.8 | 1.5 | 1.0 | 3.2 |
| Walney Extension 3 + 4 | 15.2 | 18.8 | 86.4 | 120.4 |
| West of Duddon Sands | 2.6 | 4.0 | 4.2 | 10.7 |

| Project | Spring Migration | Breeding | Autumn Migration | Annual total collisions |
|---|------------------|---------------|------------------|-------------------------|
| Walney 1 + 2 | 1.7 | 5.1 | 2.6 | 9.4 |
| Burbo Bank | 0.4 | 0.7 | 0.7 | 1.8 |
| Ormonde | Unavailable | Unavailable | Unavailable | 3.3 |
| Barrow | 0.6 | 1.2 | 0.8 | 2.6 |
| Robin Rigg | 0.7 | 1.3 | 1.3 | 3.3 |
| Arklow Bank Phase one | Unavailable | Unavailable | Unavailable | 0.0 |
| Twin Hub | Unavailable | Unavailable * | Unavailable | 9.7 |
| Erebus | 12.5 | 0.5 | 24.6 | 37.7 |
| Morgan | 5.3 | 16.4 | 18.3 | 40.0 |
| Morecambe | 0.6 | 16.3 | 8.5 | 25.4 |
| Mona | 8.7 | 15.5 | 8.4 | 32.7 |
| White Cross | 9.3 | 3.7 | 1.9 | 14.8 |
| West of Orkney | 21.0 | 17.1* | 16.4 | 54.5 |
| Llyr floating | 2.2 | 1.1 | 21.2 | 24.5 |
| Moorir Vanin | 19.3 | 11.1 | 16.5 | 46.9 |
| Arklow | 90.1 | 25.8 | 38.8 | 154.7 |
| Oriel | 26.5 | 4.6 | 24.0 | 55.1 |
| Codling | 4.2 | 4.2 | 9.9 | 18.3 |
| Dublin Array | 5.5 | 13.6 | 10.5 | 29.5 |
| Total (without the proposed development) | 250.1 | 170.2 | 316.1 | 736.3 |
| The proposed development (migration-free bio-season) | 4.3 | 9.6 | 3.9 | 17.9 |
| The proposed development (full breeding bio-season) | 6.5 | 4.9 | 6.4 | 17.9 |
| Total (with the proposed development) – Developer full breeding bio-season | 254.4 | 179.8 | 320.0 | 754.2 |
| Total (with the proposed development) – | 256.6 | 175.1 | 322.5 | 754.2 |

| Project | Spring Migration | Breeding | Autumn Migration | Annual total collisions |
|-------------------------------------|------------------|----------|------------------|-------------------------|
| Developer migration-free bio-season | | | | |

To note * indicates impacts that were not included into the breeding season total as these projects are outside the mean max foraging range (Woodward *et al.*, 2019). See NatureScot Guidance Note 3 for further clarity (NatureScot, 2023e).

During the breeding bio-season, 175 (175.1) kittiwake are predicted to be at risk of cumulative collision mortality. Based on a breeding bio-season regional population size of 142,464 individuals (Table A15.7) and a baseline mortality of 22,509 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of 180 cumulative collision mortalities would represent a 0.780% increase in baseline mortality.

During the spring migration bio-season 257 (256.6) kittiwake are predicted to be at risk of cumulative collision mortality. Based on a spring migration bio-season regional population size of 717,986 individuals (Table A15.7) and a baseline mortality of 112,462 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of 254 cumulative collision mortalities would represent a 0.228% increase in baseline mortality.

During the autumn migration bio-season 322 (322.5) kittiwake are predicted to be at risk of cumulative collision mortality. Based on an autumn migration bio-season regional population size of 937,798 individuals (Table A15.7) and a baseline mortality of 147,165 individuals per annum (based on an average mortality rate of 0.158; Table A15.8) the addition of 320 cumulative collision mortalities would represent a 0.226% increase in baseline mortality.

The predicted annual cumulative total of kittiwake subject to collision mortality is 754 (754.2) individuals, of which the proposed development contributes 18 (17.9) mortalities. Based on the largest regional population size of 933,197 individuals (Table A15.7) and a baseline mortality of 147,165 individuals per annum (based on an average mortality rate of 0.158; Table A15.8), the addition of 754 (754.2) collision consequent mortalities would represent a 0.513% increase in baseline mortality. Considering the biogeographic population size of 1,098,000, with a baseline mortality of 189,295 individuals per annum, the addition of 754 collision consequent mortalities would represent a 0.094% increase in baseline mortality. The full range of results is presented in Table A15.78.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from collision for tier 1 projects would be low (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of kittiwake to collision is high and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is low. The high sensitivity and low magnitude of the impact on kittiwake results in a moderate cumulative effect for Project Option 1, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the high sensitivity and low magnitude of the impact on kittiwake results in a moderate effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.78 Predicted cumulative annual collision impacts on kittiwake from the proposed development during the operational phase for all project tiers

| Bio-season (months) | Estimated mortality (individuals) | Percentage increase in baseline mortality |
|--|-----------------------------------|---|
| Furness approach to bio-seasons | | |
| Autumn migration | 320.0 | 0.217% |
| Breeding | 179.8 | 0.800% |
| Spring migration | 254.4 | 0.226% |
| Annual (regional population) | 754.2 | 0.513% |
| Annual (biogeographic) | 754.2 | 0.094% |
| Site-specific approach to bio-seasons | | |
| Autumn migration | 332.5 | 0.226% |
| Breeding | 175.1 | 0.780% |
| Spring migration | 256.6 | 0.228% |
| Annual (regional population) | 754.2 | 0.513% |
| Annual (biogeographic) | 754.2 | 0.094% |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for kittiwake.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for kittiwake.

15.9.7.2 Common gull

Sensitivity of common gull

As outlined in Section 15.5, common gull have an overall sensitivity of medium.

Tier 1

Magnitude of impact

The predicted annual total number of birds subject to collision mortality as a result of the proposed development combined with other developments is presented in Table A 15.79 below.

Table A 15.79 Common gull cumulative collision mortality for all tier projects

| Project | Non-breeding | Annual total collisions |
|------------|--------------|-------------------------|
| Awel-y-Mor | 0.1 | 0.1 |
| Barrow | Unknown | Unknown |
| Burbo Bank | Unknown | Unknown |

| Project | Non-breeding | Annual total collisions |
|---|--------------|-------------------------|
| Burbo Bank Extention | Unknown | Unknown |
| Erebus Floating Demo | Unknown | Unknown |
| Gwynt-y-Mor | Unknown | Unknown |
| Llyr 1 | Unknown | Unknown |
| Mona | 0.0 | 0.0 |
| Mooir Vannin | 0.0 | 0.0 |
| Morecambe | 0.0 | 0.0 |
| Morgan | 0.0 | 0.0 |
| North Hoyle | Unknown | Unknown |
| Ormonde | Unknown | Unknown |
| Robin Rigg | Unknown | Unknown |
| Rhyl Flats | Unknown | Unknown |
| TwinHub | Unknown | Unknown |
| Walney 1 | 0.0 | 0.0 |
| Walney 2 | 0.0 | 0.0 |
| Walney Extension 3 + 4 | 21.2 | 21.2 |
| West Duddon Sands | Unknown | Unknown |
| West of Orkney | 0.0 | 0.0 |
| White Cross | 0.0 | 0.0 |
| Arklow | 72.0 | 72.0 |
| Oriel | 20.3 | 20.3 |
| Dublin | 3.1 | 3.1 |
| Codling | 2.4 | 2.4 |
| Total (without the proposed development) | 119.0 | 119.0 |
| The proposed development | 3.01 | 3.07 |
| Total (with the proposed development) | 122.0 | 122.1 |

During the non-breeding bio-season, 122 (122.0) common gull are predicted to be at risk of cumulative collision mortality. Based on a breeding bio-season regional population size of 11,030 individuals (Table A15.7) and a baseline mortality of 2,791 individuals per annum (based on an average mortality rate of 0.253; Table A15.8), the addition of 122 cumulative collision mortalities would represent a 4.373% increase in baseline mortality.

The predicted annual cumulative total of common gull subject to collision mortality is 122 (122.1) individuals, of which the proposed development contributes three (3.1) mortalities. Based on the largest regional population size of 11,030 individuals (Table A15.7) and a baseline mortality of 2,791 individuals per annum (based on an average mortality rate of 0.253; Table A15.8), the addition of 122 collision consequent mortalities would represent a 0.715% increase in baseline mortality. The results are presented in Table A15.80.

As the percentage increase in baseline mortality exceeds 1% at the non-breeding and regional population scale, further consideration is given in the form of PVA. Full details of the PVA analysis are provided in Appendix A15.6: Offshore Ornithology Population Viability Analysis.

Results of the PVA are presented in Table A15.81 below. Metrics used for the interpretation of PVA outputs are the CGR and CPS values. The non-breeding total mortalities equate to 122 individuals per annum which results in a CGR and CPS of 0.985 and 0.583 respectively. Over the 35-year timeframe, this represents a 1.485% reduction in annual growth rate. The annual total mortalities are predicted to be 122 individuals per annum, resulting in a CGR and CPS are 0.985 and 0.589 respectively. Over the 35-year timeframe, this represents a 1.463% reduction in annual growth rate.

However, this result reflects PVA modelling that has been undertaken on a precautionary basis. The regional population estimate of 11,030 birds represents a substantial underestimate of the true non-breeding population. This value is derived from apportioning NWIS cSPA peak abundances using species ratios from the DAS dataset, but it does not capture the full scale of birds occurring in the wider regional system during the non-breeding season. In contrast, Furness (2015) identifies a regional non-breeding population of approximately 67,500 birds, which is considered to be the most ecologically realistic and relevant estimate for assessment purposes. Using this estimate, the increase in baseline mortality equates to less than 1%.

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from collision risk for all tier projects would be low. The greatest magnitude of impact based on PVA analysis using the smaller western Irish Sea population is considered to be medium (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of common gull to collision is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is medium. The medium sensitivity and medium magnitude of the impact on common gull results in a moderate cumulative effect for Project Option 1, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the medium sensitivity and medium magnitude of the impact on common gull results in an moderate effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.80 Predicted cumulative annual collision impacts on common gull from the proposed development during the operational phase for all project tiers

| Bio-season (months) | Estimated mortality (individuals) | Percentage increase in baseline mortality |
|------------------------------|-----------------------------------|---|
| Non-breeding | 122.0 | 4.373% |
| Annual (regional population) | 122.1 | 0.715% |

Table A15.81 Common gull PVA results for potential cumulative effects

| Bio-season | Scenario | Mortalities (per annum) | Impact on survival (%) | CGR | CPS |
|-------------------|----------------------------|-------------------------|------------------------|-------|-------|
| Non-breeding | Proposed development alone | 3.0 | <0.0001 | 1.000 | 0.984 |
| | Cumulative | 122.0 | 0.011 | 0.985 | 0.583 |
| Annual (regional) | Proposed development alone | 3.1 | <0.001 | 1.000 | 0.983 |
| | Cumulative | 122.1 | 0.011 | 0.985 | 0.589 |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for common gull.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for common gull.

15.9.7.3 Great black-backed gull

Sensitivity of great black-backed gull

As outlined in Section 15.5, great black-backed gull have an overall sensitivity of high.

Tier 1

Magnitude of impact

The predicted annual total number of birds subject to collision mortality as a result of the proposed development combined with other developments is presented in Table A15.82 below.

Table A15.82 Great black-backed gull cumulative collision mortality for all tier projects

| Project | Breeding | Non-breeding | Annual total collisions |
|----------------------|----------|--------------|-------------------------|
| Awel-y-Mor | 5.3* | 0.6 | 5.9 |
| Barrow | 0.8* | 1.4 | 2.2 |
| Burbo Bank | 1.3* | 1.0 | 2.3 |
| Burbo Bank Extension | 3.9* | 2.8 | 6.7 |
| Erebus Floating Demo | 0.0* | 0.8 | 0.8 |
| Gwynt-y-Mor | 5.7* | 4.5 | 10.3 |
| Llyr 1 | 0.7* | 1.0 | 1.6 |
| Mona | 1.7* | 3.2 | 4.8 |
| Mooir Vannin | 0.9* | 0.7 | 1.6 |
| Morecambe | 0.7* | 1.1 | 1.8 |
| Morgan | 1.1* | 4.6 | 5.7 |

| Project | Breeding | Non-breeding | Annual total collisions |
|---|-------------|--------------|-------------------------|
| North Hoyle | 1.0* | 0.7 | 1.7 |
| Ormonde | Unknown | Unknown | 0.3 |
| Robin Rigg | 2.0* | 2.2 | 4.2 |
| Rhyl Flats | 0.9* | 1.0 | 1.9 |
| Twin Hub | Unknown | Unknown | 15.7 |
| Walney 1 | 2.5* | 1.7 | 4.2 |
| Walney 2 | 2.1* | 2.1 | 4.2 |
| Walney Extension 3 + 4 | 5.9* | 20.1 | 26.0 |
| West Duddon Sands | 5.7* | 2.7 | 8.4 |
| West of Orkney | 0.8* | 0.4 | 1.2 |
| White Cross | 0.9* | 0.0 | 0.9 |
| Arklow | 0.0 | 0.0 | 0.0 |
| Oriel | 15.7 | 50.2 | 65.9 |
| Dublin | 3.7 | 5.3 | 9.0 |
| Codling | 3.7 | 0.5 | 4.1 |
| Total (without the proposed development) | 23.1 | 108.5 | 191.4 |
| The proposed development | 2.1 | 11.3 | 13.4 |
| Total (with the proposed development) | 25.2 | 119.8 | 204.8 |

To note * indicates impacts that were not included into the breeding season total as these projects are outside the mean max foraging range (Woodward *et al.*, 2019). See NatureScot Guidance Note 3 for further clarity (NatureScot, 2023e).

During the breeding bio-season, 25 (25.2) great black-backed gull are predicted to be at risk of cumulative collision mortality. Based on a breeding bio-season regional population size of 2,685 individuals (Table A15.7) and a baseline mortality of 260 individuals per annum (based on an average mortality rate of 0.097; Table A15.8), the addition of 25 cumulative collision mortalities would represent a 9.670% increase in baseline mortality.

During the non-breeding bio-season 120 (119.8) great black-backed gull are predicted to be at risk of cumulative collision mortality. Based on a non-breeding bio-season regional population size of 53,406 individuals (Table A15.7) and a baseline mortality of 5,074 individuals per annum (based on an average mortality rate of 0.097; Table A15.8), the addition of 120 cumulative collision mortalities would represent a 2.315% increase in baseline mortality.

The predicted annual cumulative total of great black-backed gull subject to collision mortality is 204 (204.8) individuals, of which the proposed development contributes 13(13.4) mortalities. Based on the largest regional population size of 53,406 individuals (Table A15.7) and a baseline mortality of 5,074 individuals per annum (based on an average mortality rate of 0.097; Table A15.8), the addition of 204 collision consequent mortalities would represent a 3.957% increase in baseline mortality. Considering the biogeographic population size of 235,000, with a baseline mortality of 22,325 individuals per annum, the addition of 204 collision consequent mortalities would represent a 0.899% increase in baseline mortality. The results are presented in Table A15.83.

As the percentage increase in baseline mortality exceeds 1% at the breeding, non-breeding and regional population scale, further consideration is given in the form of PVA. Full details of the PVA analysis are provided in Appendix A15.6: Offshore Ornithology Population Viability Analysis.

Results of the PVA are presented in Table A 15.84 below. Metrics used for the interpretation of PVA outputs are the CGR and CPS values. The cumulative breeding total mortalities are 25 individuals per annum, resulting in a CGR and CPS of 0.989 and 0.681, respectively. Over the 35-year timeframe, this represents a 1.064% reduction in annual growth rate.

The non-breeding the total mortalities equate to 120 individuals per annum which results in a CGR and CPS of 0.997 and 0.922 respectively. Over the 35-year timeframe, this represents a 0.255% reduction in annual growth rate. These impacts are considered to be sufficiently small that they would be indistinguishable from natural fluctuations in the population, regardless of current population trend.

The annual total mortalities are predicted to be 145 individuals per annum, resulting in a CGR and CPS are 0.997 and 0.895 respectively. Over the 35-year timeframe, this represents a 0.309% reduction in annual growth rate. These impacts are considered to be sufficiently small that they would be indistinguishable from natural fluctuations in the population, regardless of current population trend. Impacts against the breeding population result in slightly greater levels of impact.

Consequently, the magnitude of annual cumulative impact from Project Option 1 and Project Option 2 resulting from collision risk for all tier projects would be medium (Table 15.7 of the 2024 EIAR). However, the annual regional PVA indicates that the overall magnitude of impact is low. This reflects the high degree of conservatism built into the collision risk modelling (particularly the avoidance rates and other precautionary parameters) which are likely to overestimate impacts relative to what would occur in reality.

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of great black-backed gull to collision is high and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is low. The high sensitivity and low magnitude of the impact on great black-backed gull results in a moderate cumulative effect for Project Option 1, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the high sensitivity and low magnitude of the impact on great black-backed gull results in a moderate effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.83 Predicted cumulative annual collision impacts on great black-backed gull from the proposed development during the operational phase for all project tiers

| Bio-season (months) | Estimated mortality (individuals) | Percentage increase in baseline mortality |
|------------------------------|-----------------------------------|---|
| Breeding | 25.16 | 9.670% |
| Non-breeding | 119.80 | 2.315% |
| Annual (regional population) | 204.80 | 3.957% |
| Annual (biogeographic) | 204.80 | 0.899% |

Table A 15.84 Great black-backed gull PVA results for potential cumulative effects

| Bio-season | Scenario | Mortalities (per annum) | Impact on survival (%) | CGR | CPS |
|-------------------|----------------------------|-------------------------|------------------------|-------|-------|
| Breeding | Proposed development alone | 2.1 | 0.001 | 0.999 | 0.968 |
| | Cumulative | 25.2 | 0.009 | 0.989 | 0.681 |
| Non-breeding | Proposed development alone | 11.3 | <0.001 | 1.000 | 0.992 |
| | Cumulative | 119.8 | 0.002 | 0.997 | 0.912 |
| Annual (regional) | Proposed development alone | 13.4 | 0.000 | 1.000 | 0.990 |
| | Cumulative | 204.8 | 0.004 | 0.996 | 0.854 |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for great black backed gull.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for great black-backed gull.

15.9.7.4 Herring gull***Sensitivity of herring gull***

As outlined in Section 15.5, herring gull have an overall sensitivity of high.

Tier 1***Magnitude of impact***

The predicted annual total number of birds subject to collision mortality as a result of the proposed development combined with other developments is presented in Table A15.85 below.

Table A15.85 Herring gull cumulative collision mortality for all tier projects

| Project | Breeding | Non-breeding | Annual total collisions |
|----------------------|----------|--------------|-------------------------|
| Awel-y-Mor | 2.0 | 1.6 | 3.6 |
| Barrow | 14.3 | 1.8 | 16.2 |
| Burbo Bank | 1.9 | 1.5 | 3.4 |
| Burbo Bank Extension | Unknown | Unknown | 29.0 |
| Erebus Floating Demo | 2.8 | 1.8 | 4.6 |
| Gwynt-y-Mor | Unknown | Unknown | Unknown |
| Llyr 1 | 0.0 | 0.0 | 0.0 |
| Mona | 0.0 | 1.5 | 1.5 |

| Project | Breeding | Non-breeding | Annual total collisions |
|---|-------------|--------------|-------------------------|
| Moor Vannin | 1.4 | 8.3 | 9.7 |
| Morecambe | 1.8 | 2.4 | 4.2 |
| Morgan | 2.0 | 7.9 | 9.9 |
| North Hoyle | 2.4 | 2.0 | 4.4 |
| Ormonde | Unknown | Unknown | 0.4 |
| Robin Rigg | 6.9 | 3.2 | 10.2 |
| Rhyl Flats | 5.2 | 2.4 | 7.6 |
| Twin Hub | Unknown | Unknown | 33.6 |
| Walney 1 | 14.8 | 3.2 | 18.0 |
| Walney 2 | 4.8 | 7.9 | 12.7 |
| Walney Extension 3 + 4 | 46.4 | 29.3 | 75.6 |
| West Duddon Sands | 32.4 | 7.3 | 39.6 |
| West of Orkney | 0.0 | 0.0 | 0.0 |
| White Cross | 0.3 | 0.0 | 0.3 |
| Arklow | 2.2 | 0.8 | 3.0 |
| Oriel | 31.3 | 60.5 | 91.8 |
| Dublin | 16.1 | 19.9 | 36.0 |
| Codling | 25.0 | 2.4 | 27.4 |
| Total (without the proposed development) | 74.7 | 165.6 | 240.3 |
| The proposed development | 15.9 | 26.5 | 42.4 |
| Total (with the proposed development) | 90.6 | 192.1 | 282.7 |

To note * indicates impacts that were not included into the breeding season total as these projects are outside the mean max foraging range (Woodward *et al.*, 2019). See NatureScot Guidance Note 3 for further clarity (NatureScot, 2023e).

During the breeding bio-season, 91 (90.6) herring gull are predicted to be at risk of cumulative collision mortality. Based on a breeding bio-season regional population size of 26,459 individuals (Table A15.7) and a baseline mortality of 4,524 individuals per annum (based on an average mortality rate of 0.172; Table A15.8), the addition of 91 cumulative collision mortalities would represent a 1.986% increase in baseline mortality.

During the non-breeding bio-season 192 (192.1) herring gull are predicted to be at risk of cumulative collision mortality. Based on a non-breeding bio-season regional population size of 187,094 individuals (Table A15.7) and a baseline mortality of 31,993 individuals per annum (based on an average mortality rate of 0.172; Table A15.8), the addition of 192 cumulative collision mortalities would represent a 0.595% increase in baseline mortality.

The predicted annual cumulative total of herring gull subject to collision mortality is 283 (282.7) individuals, of which the proposed development contributes 42 (42.4) mortalities. Based on the largest regional population size of 187,094 individuals (Table A15.7) and a baseline mortality of 31,993 individuals per

annum (based on an average mortality rate of 0.172; Table A15.8), the addition of 283 collision consequent mortalities would represent a 0.876% increase in baseline mortality. Considering the biogeographic population size of 1,098,000, with a baseline mortality of 187,758 individuals per annum, the addition of 283 collision consequent mortalities would represent a 0.149% increase in baseline mortality. The results are presented in Table A15.86.

As the percentage increase in baseline mortality exceeds 1% at the breeding population scale, further consideration is given in the form of PVA. Full details of the PVA analysis are provided in Appendix A15.6: Offshore Ornithology Population Viability Analysis.

Results of the PVA are presented in Table A15.87 below. Metrics used for the interpretation of PVA outputs are the CGR and CPS values. Considering the cumulative breeding total mortalities of 91 individuals per annum, the CGR and CPS are 0.996 and 0.862 respectively. Over the 35-year timeframe, this represents a 0.412% reduction in annual growth rate. These impacts are considered to be sufficiently small that they would be indistinguishable from natural fluctuations in the population, regardless of current population trend.

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from collision risk for all tier projects would be medium. However, based on PVA analysis the overall magnitude is considered to be low (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of herring gull to collision is high and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is low. The high sensitivity and low magnitude of the impact on herring gull results in a moderate cumulative effect for Project Option 1, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the high sensitivity and low magnitude of the impact on herring gull results in a moderate effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.86 Predicted cumulative annual collision impacts on herring gull from the proposed development during the operational phase for all project tiers

| Bio-season (months) | Estimated mortality (individuals) | Percentage increase in baseline mortality |
|------------------------------|-----------------------------------|---|
| Breeding | 90.6 | 1.986% |
| Non-breeding | 192.1 | 0.595% |
| Annual (regional population) | 282.7 | 0.876% |
| Annual (biogeographic) | 282.7 | 0.149% |

Table A15.87 - PVA results for herring gull for the proposed development alone and cumulatively for the cumulative impacts to the breeding bio-season population

| Scenario | Mortalities (per annum) | Impact on adult survival (%) | CGR | CPS |
|----------------------------|-------------------------|------------------------------|-------|-------|
| Proposed development alone | 15.90 | 0.001 | 0.999 | 0.974 |
| Cumulative | 90.60 | 0.003 | 0.996 | 0.862 |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for herring gull.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for herring gull.

15.9.7.5 Lesser black-backed gull

Sensitivity of lesser black-backed gull

As outlined in Section 15.5, lesser black-backed gull have an overall sensitivity of high.

Tier 1

Magnitude of impact

The predicted annual total number of birds subject to collision mortality as a result of the proposed development combined with other developments is presented in Table A15.88 below.

Table A15.88 Lesser black-backed gull cumulative collision mortality

| Project | Spring Migration | Breeding | Autumn Migration | Migration-free winter | Annual total collisions |
|----------------------|------------------|----------|------------------|-----------------------|-------------------------|
| Awel y Mor | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Barrow | Unknown | Unknown | Unknown | Unknown | 7.3 |
| Burbo Bank | Unknown | Unknown | Unknown | Unknown | 2.1 |
| Burbo Bank Extension | Unknown | Unknown | Unknown | Unknown | 53.7 |
| Erebus Floating Demo | 0.0 | 7.6 | 0.6 | 0.0 | 8.2 |
| Gwynt y Mor | Unknown | Unknown | Unknown | Unknown | 7.3 |
| Llyr 1 | 0.4 | 1.1* | 0.2 | 0.2 | 1.9 |
| Mona | 0.8 | 0.3 | 0.0 | 0.8 | 1.6 |
| Mooir Vannin | 2.0 | 0.3 | 0.5 | 0.0 | 2.8 |
| Morecambe | 0.2 | 2.0 | 1.2 | 0.2 | 3.6 |
| Morgan | 0.3 | 0.3 | 0.4 | 0.3 | 1.3 |
| North Hoyle | Unknown | Unknown | Unknown | Unknown | 0.7 |
| Ormonde | Unknown | Unknown | Unknown | Unknown | 27.0 |
| Robin Rigg | 0.2 | 4.4 | 0.4 | 0.4 | 5.4 |
| Rhyl Flats | Unknown | Unknown | Unknown | Unknown | 0.7 |
| TwinHub | Unknown | Unknown | Unknown | Unknown | 8.3 |
| Walney 1 + 2 | Unknown | Unknown | Unknown | Unknown | 69.8 |

| Project | Spring Migration | Breeding | Autumn Migration | Migration-free winter | Annual total collisions |
|---|------------------|-------------|------------------|-----------------------|-------------------------|
| Walney Extension 3 + 4 | 3.2 | 8.9 | 7.6 | 16.1 | 35.7 |
| West Duddon Sands | Unknown | Unknown | Unknown | Unknown | 63.9 |
| West of Orkney | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| White Cross | 0.0 | 0.4* | 0.0 | 0.0 | 0.0 |
| Arklow | 0.8 | 0.0 | 0.0 | 0.0 | 0.8 |
| Oriel | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Dublin | 0.2 | 3.3 | 0.3 | 0.4 | 4.1 |
| Codling | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total (without the proposed development) | 8.0 | 27.2 | 11.2 | 18.3 | 305.1 |
| The proposed development | 0.0 | 1.0 | 0.0 | 0.0 | 1.0 |
| Total (with the proposed development) | 8.0 | 28.2 | 11.2 | 18.3 | 306.1 |

To note * indicates impacts that were not included into the breeding season total as these projects are outside the mean max foraging range (Woodward *et al.*, 2019). See NatureScot Guidance Note 3 for further clarity (NatureScot, 2023e).

During the breeding bio-season, 28 (28.2) lesser black-backed gull are predicted to be at risk of cumulative collision mortality. Based on a breeding bio-season regional population size of 75,470 individuals (Table A15.7) and a baseline mortality of 9,283 individuals per annum (based on an average mortality rate of 0.124; Table A15.8), the addition of 28 cumulative collision mortalities would represent a 0.314% increase in baseline mortality.

During the spring migration bio-season 18 (18.3) lesser black-backed gull are predicted to be at risk of cumulative collision mortality. Based on a spring migration bio-season regional population size of 171,500 individuals (Table A15.7) and a baseline mortality of 21,095 individuals per annum (based on an average mortality rate of 0.124; Table A15.8), the addition of 18 cumulative collision mortalities would represent a 0.086% increase in baseline mortality.

During the autumn migration bio-season eight (8.0) lesser black-backed gull are predicted to be at risk of cumulative collision mortality. Based on an autumn migration bio-season regional population size of 171,500 individuals (Table A15.7) and a baseline mortality of 21,095 individuals per annum (based on an average mortality rate of 0.124; Table A15.8) the addition of eight cumulative collision mortalities would represent a 0.038% increase in baseline mortality.

During the migration free breeding bio-season 11 (11.2) lesser black-backed gull are predicted to be at risk of cumulative collision mortality. Based on an migration-free winter bio-season regional population size of 53,368 individuals (Table A15.7) and a baseline mortality of 6,564 individuals per annum (based on an average mortality rate of 0.124; Table A15.8) the addition of 11 cumulative collision mortalities would represent a 0.169% increase in baseline mortality.

The predicted annual cumulative total of lesser black-backed gull subject to collision mortality is 306 (306.1) individuals, of which the proposed development contributes one (1.0) mortality. Based on the largest regional population size of 171,500 individuals (Table A15.7) and a baseline mortality of 21,095 individuals per annum (based on an average mortality rate of 0.124; Table A15.8), the addition of 306 collision

consequent mortalities would represent a 1.443% increase in baseline mortality. Considering the biogeographic population size of 864,000, with a baseline mortality of 106,272 individuals per annum, the addition of 306 collision consequent mortalities would represent a 0.286% increase in baseline mortality. The results are presented in Table A 15.89.

As the percentage increase in baseline mortality at the regional population level exceeds 1%, further consideration in the form of a PVA analysis is given below. Full details of the PVA analysis are provided in Appendix A15.6: Offshore Ornithology Population Viability Analysis.

Results of the PVA are presented in Table A15.90 below. Metrics used for the interpretation of PVA outputs are the CGR and CPS values. Considering the cumulative annual total mortalities of 306 (306.1) individuals per annum, the CGR and CPS are 0.998 and 0.929 respectively. Over the 35-year timeframe, this represents a 0.203% reduction in annual growth rate. This impact is considered to be sufficiently small that they would be indistinguishable from natural fluctuations in the population, regardless of current population trend.

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from collision risk for tier 1 projects would be medium. However, based on PVA analysis the overall magnitude is considered to be low (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of lesser black-backed gull to collision is high and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is low. The high sensitivity and low magnitude of the impact on lesser black-backed gull results in a moderate cumulative effect for Project Option 1, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the high sensitivity and low magnitude of the impact on lesser black-backed gull results in a moderate effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A 15.89 Predicted cumulative annual collision impacts on lesser black-backed gull from the proposed development during the operational phase for all project tiers

| Bio-season (months) | Estimated mortality (individuals) | Percentage increase in baseline mortality |
|------------------------------|-----------------------------------|---|
| Autumn migration | 8.03 | 0.038% |
| Breeding | 28.2 | 0.302% |
| Migration-free winter | 11.2 | 0.169% |
| Spring migration | 18.3 | 0.086% |
| Annual (regional population) | 306.1 | 1.443% |
| Annual (biogeographic) | 306.1 | 0.286% |

Table A15.90 - PVA results for lesser black-backed gull for the proposed development alone and cumulatively for the annual total impact to the regional population

| Scenario | Mortalities (per annum) | Increase in mortality | CGR | CPS |
|----------------------------|-------------------------|-----------------------|-------|-------|
| Proposed development alone | 1.01 | <0.001 | 1.000 | 1.000 |

| Scenario | Mortalities (per annum) | Increase in mortality | CGR | CPS |
|------------|-------------------------|-----------------------|-------|-------|
| Cumulative | 306.1 | 0.002 | 0.998 | 0.929 |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for lesser black-backed gull.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for lesser black-backed gull.

15.9.7.6 Roseate tern

Sensitivity of roseate tern

As outlined in Section 15.5, roseate tern have an overall sensitivity of medium.

Tier 1

Magnitude of impact

The predicted annual total number of birds subject to collision mortality as a result of the proposed development combined with other developments is presented in Table A15.91 below.

Table A15.91 Roseate tern cumulative collision mortality

| Project | Spring Migration | Breeding | Autumn Migration | Annual total collisions |
|------------------------|------------------|----------|------------------|-------------------------|
| Awel-y-Mor | 0.0 | 0.0 | 0.0 | 0.0 |
| Gwynt y Mor | Unknown | Unknown | Unknown | Unknown |
| Rhyl Flats | Unknown | Unknown | Unknown | Unknown |
| Burbo Bank Extension | Unknown | Unknown | Unknown | Unknown |
| North Hoyle | Unknown | Unknown | Unknown | Unknown |
| Walney Extension 3 + 4 | Unknown | Unknown | Unknown | Unknown |
| West of Duddon Sands | Unknown | Unknown | Unknown | Unknown |
| Walney 1 + 2 | Unknown | Unknown | Unknown | Unknown |
| Burbo Bank | Unknown | Unknown | Unknown | Unknown |
| Ormonde | Unknown | Unknown | Unknown | Unknown |
| Barrow | Unknown | Unknown | Unknown | Unknown |
| Robin Rigg | Unknown | Unknown | Unknown | Unknown |
| Arklow Bank Phase one | Unknown | Unknown | Unknown | Unknown |
| Twin Hub | 0.0 | Unknown | Unknown | Unknown |

| Project | Spring Migration | Breeding | Autumn Migration | Annual total collisions |
|---|------------------|------------|------------------|-------------------------|
| Erebus | 0.0 | 0.0 | 0.0 | 0.0 |
| Morgan | 0.0 | 0.0 | 0.0 | 0.0 |
| Morecambe | 0.0 | 0.0 | 0.0 | 0.0 |
| Mona | 0.0 | 0.0 | 0.0 | 0.0 |
| White Cross | 0.0 | 0.0 | 0.0 | 0.0 |
| Arklow | 0.0 | 0.0 | 0.0 | 0.0 |
| Oriel | 0.0 | 0.0 | 0.0 | 0.0 |
| Dublin | 0.0 | 0.2 | 0.1 | 0.3 |
| Codling | 0.0 | 0.0 | 0.0 | 0.0 |
| Total (without the proposed development) | 0.0 | 0.2 | 0.1 | 0.3 |
| The proposed development | 0.0 | 1.2 | 0.0 | 1.2 |
| Total (with the proposed development) | 0.0 | 1.3 | 0.1 | 1.4 |

During the breeding bio-season one (1.3) roseate tern is predicted to be at risk of cumulative collision mortality. Based on a breeding bio-season regional population size of 5,586 individuals (Table A15.7) and a baseline mortality of 966 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of less than one cumulative collision mortality would represent a 0.123% increase in baseline mortality.

During the spring migration bio-season zero (0.0) roseate tern are predicted to be at risk of cumulative collision mortality. Based on a spring migration bio-season regional population size of 6,375 individuals (Table A15.7) and a baseline mortality of 1,103 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of zero cumulative collision mortalities would represent a 0.000% increase in baseline mortality.

During the autumn migration bio-season less than one (0.1) roseate tern are predicted to be at risk of cumulative collision mortality. Based on an autumn migration bio-season regional population size of 6,375 individuals (Table A15.7) and a baseline mortality of 1,103 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of zero cumulative collision mortalities would represent a 0.009% increase in baseline mortality.

Across all bio-seasons, a total of one (1.4) roseate tern is predicted to be at risk of cumulative collision mortality. Based on the largest regional population size of 6,375 individuals (Table A15.7) and a baseline mortality of 1,103 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of one cumulative collision mortalities would represent a 0.117% increase in baseline mortality. Considering the biogeographic population of 2,900 individuals (Table A15.7) and a baseline mortality of 502 individuals per annum, the addition of one cumulative collision mortalities would represent a 0.256% increase in baseline mortality.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from collision for all tier projects would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of roseate tern to collision is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is negligible. The medium sensitivity and negligible magnitude of the impact on roseate tern results in an imperceptible cumulative effect for Project Option 1, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the medium sensitivity and negligible magnitude of the impact on roseate tern results in a imperceptible effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.92 Predicted cumulative annual collision impacts on roseate tern from the proposed development during the operational phase for all project tiers

| Bio-season (months) | Estimated mortality (individuals) | Percentage increase in baseline mortality |
|------------------------------|-----------------------------------|---|
| Autumn migration | 0.1 | 0.009% |
| Breeding | 1.3 | 0.123% |
| Spring migration | 0.0 | 0.000% |
| Annual (regional population) | 1.4 | 0.117% |
| Annual (biogeographic) | 1.4 | 0.256% |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for roseate tern.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for roseate tern.

15.9.7.7 Arctic tern

Sensitivity of Arctic tern

As outlined in Section 15.5, Arctic tern have an overall sensitivity of medium.

Tier 1

Magnitude of impact

The predicted annual total number of birds subject to collision mortality as a result of the proposed development combined with other developments is presented in Table A15.93 below.

Table A15.93 Arctic tern cumulative collision mortality

| Project | Spring Migration | Breeding | Autumn Migration | Annual total collisions |
|---|------------------|-------------|------------------|-------------------------|
| Awel-y-Mor | Unknown | Unknown | Unknown | 0.5 |
| Gwynt y Mor | Unknown | Unknown | Unknown | Unknown |
| Rhyl Flats | Unknown | Unknown | Unknown | Unknown |
| Burbo Bank Extension | Unknown | Unknown | Unknown | Unknown |
| North Hoyle | Unknown | Unknown | Unknown | Unknown |
| Walney Extension 3 + 4 | Unknown | Unknown | Unknown | Unknown |
| West of Duddon Sands | Unknown | Unknown | Unknown | Unknown |
| Walney 1 + 2 | Unknown | Unknown | Unknown | Unknown |
| Burbo Bank | Unknown | Unknown | Unknown | Unknown |
| Ormonde | Unknown | Unknown | Unknown | Unknown |
| Barrow | Unknown | Unknown | Unknown | Unknown |
| Robin Rigg | Unknown | Unknown | Unknown | Unknown |
| Arklow Bank Phase one | Unknown | Unknown | Unknown | Unknown |
| Twin Hub | Unknown | Unknown | Unknown | Unknown |
| Erebus | 0.0 | 0.0 | 0.0 | 0.0 |
| Morgan | 0.0 | 0.0 | 0.0 | 0.0 |
| Morecambe | 0.0 | 0.0 | 0.0 | 0.0 |
| Mona | 0.0 | 0.0 | 0.0 | 0.0 |
| White Cross | 0.0 | 0.0 | 0.0 | 0.0 |
| Arklow | 0.6 | 4.4 | 0.1 | 0.7 |
| Oriel | 0.0 | 0.0 | 0.0 | 0.0 |
| Dublin | 0.0 | 0.0 | 0.0 | 0.0 |
| Codling | 0.0 | 0.0 | 0.0 | 0.0 |
| Total (without the proposed development) | 0.60 | 0.03 | 0.10 | 1.23 |
| The proposed development | 0.0 | 0.3 | 0.0 | 0.3 |
| Total (with the proposed development) | 0.6 | 0.3 | 0.1 | 1.5 |

During the breeding bio-season, less than one (0.3) arctic tern is predicted to be at risk of cumulative

collision mortality. Based on a breeding bio-season regional population size of 24,532 individuals (Table A15.7) and a baseline mortality of 4,489 individuals per annum (based on an average mortality rate of 0.163; Table A15.8), the addition of less than one cumulative collision mortality would represent a 0.862% increase in baseline mortality.

During the spring migration bio-season one (0.6) Arctic tern are predicted to be at risk of cumulative collision mortality. Based on a spring migration bio-season regional population size of 72,231 individuals (Table A15.7) and a baseline mortality of 13,218 individuals per annum (based on an average mortality rate of 0.163; Table A15.8), the addition of zero cumulative collision mortalities would represent a 0.005% increase in baseline mortality.

During the autumn migration bio-season less than one (0.1) Arctic tern are predicted to be at risk of cumulative collision mortality. Based on an autumn migration bio-season regional population size of 72,231 individuals (Table A15.7) and a baseline mortality of 13,218 individuals per annum (based on an average mortality rate of 0.163; Table A15.8), the addition of less than one cumulative collision mortalities would represent a 0.001% increase in baseline mortality.

Across all bio-seasons, a total of two (1.5) Arctic tern is predicted to be at risk of cumulative collision mortality. Based on the largest regional population of 72,231 individuals (Table A15.7) and a baseline mortality of 13,218 individuals per annum (based on an average mortality rate of 0.163; Table A15.8), the addition of two cumulative collision mortalities would represent a 0.013% increase in baseline mortality. Considering the biogeographic population of 628,000 individuals (Table A15.7) and a baseline mortality of 114,924 individuals per annum, the addition of two cumulative collision mortalities would represent a 0.001% increase in baseline mortality. The results are presented in Table A15.93.

At both the regional population and biogeographic population scales, the cumulative impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from collision for all tier projects would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of Arctic tern to collision is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is low. The medium sensitivity and low magnitude of the impact on Arctic tern results in an imperceptible cumulative effect for Project Option 1, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR .

Project Option 2

Impacts from Project Option 2 are calculated to be equal to or less than those from Project Option 1. Therefore, the medium sensitivity and negligible magnitude of the impact on Arctic tern results in an imperceptible effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.94 Predicted cumulative annual collision impacts on Arctic tern from the proposed development during the operational phase for all project tiers

| Bio-season (months) | Estimated mortality (individuals) | Percentage increase in baseline mortality |
|------------------------------|-----------------------------------|---|
| Autumn migration | 0.1 | 0.001% |
| Breeding | 0.3 | 0.965% |
| Spring migration | 0.6 | 0.005% |
| Annual (regional population) | 1.5 | 0.013% |

| Bio-season (months) | Estimated mortality (individuals) | Percentage increase in baseline mortality |
|------------------------|-----------------------------------|---|
| Annual (biogeographic) | 1.5 | 0.001% |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for Arctic tern.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for Arctic tern.

15.9.7.8 Common tern

Sensitivity of common tern

As outlined in Section 15.5, common tern have an overall sensitivity of medium.

Tier 1

Magnitude of impact

The predicted annual total number of birds subject to collision mortality as a result of the proposed development combined with other developments is presented in Table A15.95 below.

Table A15.95 Common tern cumulative collision mortality for all tier projects

| Project | Spring Migration | Breeding | Autumn Migration | Annual total collisions |
|------------------------|------------------|----------|------------------|-------------------------|
| Awel-y-Mor | unknown | unknown | unknown | 0.2 |
| Gwynt y Mor | unknown | unknown | unknown | unknown |
| Rhyl Flats | unknown | unknown | unknown | unknown |
| Burbo Bank Extension | unknown | unknown | unknown | unknown |
| North Hoyle | unknown | unknown | unknown | unknown |
| Walney Extension 3 + 4 | unknown | unknown | unknown | unknown |
| West of Duddon Sands | unknown | unknown | unknown | unknown |
| Walney 1 + 2 | unknown | unknown | unknown | unknown |
| Burbo Bank | unknown | unknown | unknown | unknown |
| Ormonde | unknown | unknown | unknown | unknown |
| Barrow | unknown | unknown | unknown | unknown |
| Robin Rigg | unknown | unknown | unknown | unknown |
| Arklow Bank Phase one | unknown | unknown | unknown | unknown |
| Twin Hub | unknown | unknown | unknown | unknown |

| Project | Spring Migration | Breeding | Autumn Migration | Annual total collisions |
|---|------------------|------------|------------------|-------------------------|
| Erebus | 0.0 | 0.0 | 0.0 | 0.0 |
| Morgan | 0.0 | 0.0 | 0.0 | 0.0 |
| Morecambe | | | | 0.2 |
| Mona | 0.0 | 0.0 | 0.0 | 0.0 |
| Arklow | 0.0 | 0.0 | 0.0 | 0.0 |
| Oriel | 0.0 | 0.0 | 0.0 | 0.0 |
| Dublin | 0.5 | 0.8 | 1.7 | 2.2 |
| Codling | 0.1 | 0.0 | 2.1 | 2.3 |
| Total (without the proposed development) | 0.6 | 0.8 | 3.8 | 4.5 |
| The proposed development | 0.0 | 0.6 | 0.0 | 0.6 |
| Total (with the proposed development) | 0.6 | 1.4 | 3.8 | 5.2 |

During the breeding bio-season, two (1.6) common tern are predicted to be at risk of cumulative collision mortality. Based on a breeding bio-season regional population size of 6,949 individuals (Table A15.7) and a baseline mortality of 1,201 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of two cumulative collision mortalities would represent a 0.117% increase in baseline mortality.

During the spring migration bio-season one (0.6) common tern are predicted to be at risk of cumulative collision mortality. Based on a spring migration bio-season regional population size of 74,000 individuals (Table A15.7) and a baseline mortality of 12,787 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of one cumulative collision mortalities would represent a 0.005% increase in baseline mortality.

During the autumn migration bio-season four (3.8) common tern are predicted to be at risk of cumulative collision mortality. Based on an autumn migration bio-season regional population size of 74,000 individuals (Table A15.7) and a baseline mortality of 12,787 individuals per annum (based on an average mortality rate of 0.173 Table A15.8) the addition of four cumulative collision mortalities would represent a 0.030% increase in baseline mortality.

Across all bio-seasons, a total of five (5.2) common tern are predicted to be at risk of cumulative collision mortality. Based on the largest regional population of 74,000 individuals (Table A15.7) and a baseline mortality of 12,787 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of five cumulative collision mortalities would represent a 0.041% increase in baseline mortality. Considering the biogeographic population of 480,000 individuals (Table A15.7) and a baseline mortality of 82,944 individuals per annum (based on an average mortality rate of 0.173; Table A15.8), the addition of five collision mortalities would represent a 0.006% increase in baseline mortality. The results are presented in Table A15.96.

Both the regional population and biogeographic population scales, the cumulative impacts from the proposed development across all bio-seasons alone and combined represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from collision for all tier projects would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Impacts from Project Option 1 are calculated to be equal to or less than those from Project Option 2. Therefore, the medium sensitivity and negligible magnitude of the impact on common tern results in an imperceptible effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Overall, it is predicted that the sensitivity of common tern to collision is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is negligible. The medium sensitivity and negligible magnitude of the impact on common tern results in an imperceptible cumulative effect for Project Option 2, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.96 Predicted cumulative annual collision impacts on common tern from the proposed development during the operational phase for all project tiers

| Bio-season (months) | Estimated mortality (individuals) | Percentage increase in baseline mortality |
|------------------------------|-----------------------------------|---|
| Autumn migration | 3.8 | 0.030% |
| Breeding | 1.4 | 0.117% |
| Spring migration | 0.6 | 0.005% |
| Annual (regional population) | 5.2 | 0.041% |
| Annual (biogeographic) | 5.2 | 0.006% |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for common tern.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for common tern.

15.9.7.9 Gannet

Sensitivity of gannet

As outlined in Section 15.5, gannet have an overall sensitivity of medium.

Tier 1

Magnitude of impact

The predicted annual total number of birds subject to collision mortality as a result of the proposed development combined with other developments is presented in Table A15.97 below.

Table A15.97 Gannet cumulative collision mortality for all tier projects

| Project | Spring Migration | Breeding | Autumn Migration | Annual total collisions |
|--|------------------|-------------|------------------|-------------------------|
| Awel-y-Mor | 0.0 | 10.9 | 2.5 | 13.4 |
| Barrow | 0.1 | 0.6 | 0.1 | 0.7 |
| Burbo Bank | 0.1 | 0.4 | 0.1 | 0.5 |
| Burbo Bank Extension | Unknown | Unknown | Unknown | 12.4 |
| Erebus Floating Demo | 0.6 | 3.4 | 0.6 | 4.6 |
| Gwynt-y-Mor | 1.0 | 7.3 | 1.2 | 9.6 |
| Llyr 1 | 0.3 | 3.1 | 0.5 | 3.9 |
| Mona | 0.4 | 4.7 | 0.5 | 5.7 |
| Mooir Vannin | 0.1 | 4.3 | 0.6 | 5.0 |
| Morecambe | 0.0 | 1.2 | 0.0 | 1.3 |
| Morgan | 0.0 | 0.4 | 0.1 | 0.5 |
| North Hoyle | 0.1 | 0.7 | 0.1 | 1.0 |
| Ormonde | Unknown | Unknown | Unknown | 6.7 |
| Robin Rigg | 0.1 | 0.7 | 0.1 | 0.9 |
| Rhyl Flats | 0.4 | 1.0 | 0.2 | 1.6 |
| Great Crested Grebe (Podiceps cristatus) | Unknown | Unknown | Unknown | 26.1 |
| Walney 1 | 0.1 | 0.9 | 0.2 | 1.2 |
| Walney 2 | 0.1 | 1.0 | 0.2 | 1.3 |
| Walney Extension 3 + 4 | 0.9 | 16.3 | 16.6 | 33.8 |
| West Duddon Sands | 0.3 | 2.0 | 0.3 | 2.6 |
| West of Orkney | 2.1 | 33.8 | 12.9 | 48.8 |
| White Cross | 0.0 | 4.4 | 1.7 | 6.1 |
| Arklow | 1.0 | 3.0 | 1.3 | 5.3 |
| Oriel | 3.0 | 17.0 | 14.0 | 34.0 |
| Dublin Array | 5.5 | 13.6 | 10.5 | 29.5 |
| Codling | 0.3 | 0.4 | 0.1 | 0.9 |
| Total with macro-avoidance (without the proposed development) | 4.9 | 26.9 | 19.0 | 50.9 |

| Project | Spring Migration | Breeding | Autumn Migration | Annual total collisions |
|---|------------------|--------------|------------------|-------------------------|
| Total without macro-avoidance (without the proposed development) | 16.5 | 97.3 | 64.4 | 178.2 |
| The proposed development | 0.0 | 3.3 | 0.4 | 3.7 |
| Total with macro-avoidance (with the proposed development) | 5.0 | 30.2 | 19.5 | 54.6 |
| Total without macro-avoidance (with the proposed development) | 16.5 | 100.6 | 64.8 | 181.9 |

The results presented in the following text are based on the Developers preferred approach of applying a macro-avoidance correction year-round. During the breeding bio-season, 30 (30.2) gannet are predicted to be at risk of cumulative collision mortality. Based on a breeding bio-season regional population size of 632,514 individuals (Table A15.7) and a baseline mortality of 118,027 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of 30 cumulative collision mortalities would represent a 0.026% increase in baseline mortality.

During the spring migration bio-season five (5.0) gannet are predicted to be at risk of cumulative collision mortality. Based on a spring migration bio-season regional population size of 643,917 individuals (Table A15.7) and a baseline mortality of 120,155 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of five cumulative collision mortalities would represent a 0.004% increase in baseline mortality.

During the autumn migration bio-season 19 (19.4) gannet are predicted to be at risk of cumulative collision mortality. Based on an autumn migration bio-season regional population size of 535,183 individuals (Table A15.7) and a baseline mortality of 99,865 individuals per annum (based on an average mortality rate of 0.187; Table A15.8) the addition of 19 cumulative collision mortalities would represent a 0.019% increase in baseline mortality.

Across all bio-seasons, a total of 55 (54.6) gannet are predicted to be at risk of cumulative collision mortality. Based on the largest regional population of 643,917 individuals (Table A15.7) and a baseline mortality of 120,155 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of 55 cumulative collision mortalities would represent a 0.045% increase in baseline mortality. Considering the biogeographic population of 1,180,000 individuals (Table A15.7) and a baseline mortality of 220,188 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of 55 collision mortalities would represent a 0.025% increase in baseline mortality. The results are presented in Table A15.101.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from collision for all tiers projects would be low (Table 15.7 of the 2024 EIAR).

Significance of the effect

Project Option 1

Overall, it is predicted that the sensitivity of gannet to collision is medium and the magnitude of the cumulative impact of the proposed development with Tier 1 projects is negligible. The medium sensitivity

and negligible magnitude of the impact on gannet results in an imperceptible cumulative effect for Project Option 1, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Project Option 2

Impacts from Project Option 2 are predicted to be equal to or less than those from Project Option 1. Therefore, the medium sensitivity and negligible magnitude of the impact on gannet results in an imperceptible effect at worst, which is not significant in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Table A15.98 Predicted cumulative annual collision impacts on gannet from the proposed development during the operational phase for all project tiers

| Bio-season (months) | Estimated mortality (individuals) | Percentage increase in baseline mortality |
|--------------------------------|-----------------------------------|---|
| With macro-avoidance | | |
| Autumn migration | 19.4 | 0.019% |
| Breeding | 30.2 | 0.026% |
| Spring migration | 5.0 | 0.004% |
| Annual (regional population) | 54.6 | 0.045% |
| Annual (biogeographic) | 54.6 | 0.025% |
| Without macro-avoidance | | |
| Autumn migration | 64.8 | 0.065% |
| Breeding | 100.6 | 0.085% |
| Spring migration | 16.5 | 0.014% |
| Annual (regional population) | 181.9 | 0.151% |
| Annual (biogeographic) | 181.9 | 0.083% |

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for common tern.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for common tern.

15.9.8 Cumulative Impact 4: Combined collision risk and displacement risk (operational phase)

For gannet which has been assessed for both cumulative collision and displacement impacts in the operational phase, a combined assessment is needed to fully understand the magnitude of the impacts from the proposed development and other projects cumulatively.

Results from collision and displacement, and the total combined impacts for gannet in the operational phase for the proposed development and other projects are presented in Table A15.99. Results are presented based on the main approach displacement values, with a range presented for gannet in brackets as carried out within Section 15.5.3.

15.9.8.1 Gannet

Sensitivity of gannet

As outlined in Section 15.5, gannet have an overall sensitivity of medium to both collision and displacement impacts.

Tier 1

Magnitude of impact

The predicted annual total number of birds subject to combined collision and displacement mortality as a result of the proposed development combined with other developments is presented in Table A15.99 below.

Table A15.99 Gannet combined displacement and collision cumulative effects for all tier projects

| Bio-season | Annual displacement mortality | | Annual collision mortality | Total combined impact | | Percentage increase in baseline mortality | |
|--------------------------------|--------------------------------|--------------------------------|----------------------------|--------------------------------|--------------------------------|---|--------------------------------|
| | 70% displacement, 1% mortality | 70% displacement, 3% mortality | | 70% displacement, 1% mortality | 70% displacement, 3% mortality | 70% displacement, 1% mortality | 70% displacement, 3% mortality |
| With macro-avoidance | | | | | | | |
| Autumn migration | 28.2 | 84.6 | 19.4 | 47.6 | 104.0 | 0.048% | 0.104% |
| Breeding | 38.4 | 115.2 | 30.2 | 68.6 | 145.4 | 0.058% | 0.123% |
| Spring migration | 5.4 | 16.3 | 5.0 | 10.4 | 21.3 | 0.009% | 0.018% |
| Annual (regional population) | 72.1 | 216.2 | 54.6 | 126.7 | 270.8 | 0.105% | 0.225% |
| Annual (biogeographic) | 72.1 | 216.2 | 54.6 | 126.7 | 270.8 | 0.058% | 0.123% |
| Without macro-avoidance | | | | | | | |
| Autumn migration | 28.2 | 84.6 | 64.8 | 93.0 | 149.4 | 0.093% | 0.150% |
| Breeding | 38.4 | 115.2 | 100.6 | 139.0 | 215.8 | 0.118% | 0.183% |
| Spring migration | 5.4 | 16.3 | 16.5 | 21.9 | 32.8 | 0.018% | 0.027% |
| Annual (regional population) | 72.1 | 216.2 | 181.9 | 254.0 | 398.1 | 0.211% | 0.331% |
| Annual (biogeographic) | 72.1 | 216.2 | 181.9 | 254.0 | 398.1 | 0.115% | 0.181% |

The predicted annual cumulative total of gannet subject to combined collision and displacement mortality is 127 (126.7) individuals, of which the proposed development contributes four (4.0) mortalities.

Based on the largest regional population size of 643,917 individuals (Table A15.7) and a baseline mortality of 120,155 individuals per annum (based on an average mortality rate of 0.187; Table A15.8), the addition of 127 combined collision and displacement consequent mortalities would represent a 0.105% increase in baseline mortality. Considering the upper mortality rate, the total number of mortalities would increase to 271 (270.8), which would represent a 0.225% increase in baseline mortality.

Considering the biogeographic population size of 1,180,000, with a baseline mortality of 220,188 individuals per annum, the addition of 127 displacement consequent mortalities would represent a 0.058% increase in baseline mortality, or 0.123% when considering the upper mortality value.

At both the regional population and biogeographic population scales, the impacts from the proposed development for each bio-season and summed across all bio-seasons represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect).

Consequently, the magnitude of cumulative impact from Project Option 1 and Project Option 2 resulting from collision for tier 1 and 2 projects would be negligible (Table 15.7 of the 2024 EIAR).

Significance of the effect

At both the regional population and biogeographic population scales, impacts across all bio-seasons would represent a <1% increase in baseline mortality (the threshold below which additional mortality is considered to have an undetectable effect). Therefore, the magnitude is considered to be low. Based on a sensitivity of medium (Table 15.6 of the 2024 EIAR) and a magnitude of low (Table 15.7 of the 2024 EIAR), the overall significance of the potential cumulative effect on gannet is slight, which is not significant in EIA terms during the operational phase based on the matrix approach in Table 15.8 of the 2024 EIAR .

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for gannet.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for gannet.

15.9.9 Cumulative Impact 5: Migratory collision risk

For a summary of updates relevant to Migratory collision risk please see Section 15.5.3.4. The RFI relating to assessing migratory collision risk cumulatively is RFI 8dii.

During operation of the proposed development, there is potential for cumulative migratory collision risk to birds arising from interactions with wind turbines and associated infrastructure. Such impacts may occur when birds pass through the array area during spring or autumn migration, potentially resulting in injury or mortality.

The potential effects on migratory birds from the Proposed Development alone are assessed as very small, with the greatest predicted impact representing only a 0.031% increase in baseline mortality for the relevant Irish migratory population. On this basis, the Proposed Development would not materially contribute to cumulative impacts. However, RFI 8dii issued to the Developer requested that a cumulative assessment be undertaken.

In response, a collaborative cumulative collision risk modelling exercise has been completed by the East Coast Phase One Irish offshore wind projects. This assessment considers cumulative impacts on Irish migratory populations arising from the Proposed Development cumulatively with the Oriel, Codling, Dublin Array, and Arklow projects. Full details of the modelling approach and methodologies are provided in Appendix A15.4: Offshore Ornithology Migratory Collision Risk Modelling: Irish East Coast Phase One Offshore Wind Projects Cumulative Assessment.

15.9.9.1 Sensitivity of migratory birds

As outlined in Section 15.5.3, migratory birds have a sensitivity of medium to migratory collision risk impacts.

Tier 1

15.9.9.2 Magnitude of impact

A quantitative cumulative assessment of projects beside the Phase One Irish projects is not considered appropriate or necessary for the Proposed Development given the extremely low level of predicted impact. The assessment approach adopted for both the standalone and Phase One Irish projects cumulative analyses is a bespoke, Irish-centric modelling framework that evaluates impacts on the Irish migratory bird population. As such, cumulative effects on this population will be driven primarily by Irish offshore wind projects, which are geographically closer and therefore more likely to influence migratory pathways and exposure levels.

In contrast, all other projects within Tier 1, comprising developments located largely within English, Welsh, and Scottish waters, are expected to have a disproportionately smaller influence on the Irish migratory population due to their greater distance and limited spatial overlap with Irish migration routes. Given this limited connectivity, these projects are not expected to contribute meaningfully to cumulative collision or displacement risk in combination with the Proposed Development. For these reasons, all other projects are not considered in the cumulative assessment for the Proposed Development, and their inclusion would not produce meaningful or ecologically realistic results.

Following the estimated collision risk to each migratory species being determined (Table A15.100) a range of zero predicted mortalities per annum (e.g. for Ruff) to a maximum 56.9 (snipe) predicted mortalities per annum were estimated for Phase One Irish projects. When considering the level of impact relative to the baseline mortality rate for each of these species, all were between 0.000% and 0.147%. This level of impact on an annual basis for all species is considered to be of negligible magnitude at most. Therefore, it can be concluded, based on the evidence available, that the proposed development will have an impact of negligible magnitude on migratory birds passing either north-south or east-west on their annual migrations (Table 15.7 of the 2024 EIAR).

Table A15.100 Summary of cumulative migratory collision risk assessment on migrant waterbirds from the East Coast Irish Phase One Projects

| Species | Irish Population (plus proportion of UK) | Adult baseline mortality rate (Robinson 2005, Horswill 2015) | Irish population baseline mortality | Annual collision rate (cumulative) | Population baseline mortality rate increase (%) |
|------------------------------------|--|--|-------------------------------------|------------------------------------|---|
| Bar-tailed godwit | 16,530 | 0.29 | 4,711 | 0.25 | 0.005 |
| Black-tailed godwit | 19,800 | 0.06 | 1,188 | 0.25 | 0.021 |
| Canadian light-bellied brent goose | 35,150 | 0.10 | 3,515 | 0.24 | 0.007 |
| Corncrake | 436 | 0.71 | 311 | 0.03 | 0.011 |
| Common scoter | 7,500 | 0.22 | 1,628 | 1.48 | 0.091 |
| Curlew | 35,240 | 0.10 | 3,559 | 0.56 | 0.016 |
| Dunlin | 45,760 | 0.26 | 11,898 | 0.54 | 0.005 |
| Eider | 5,660 | 0.08 | 475 | 0.36 | 0.075 |
| Golden plover | 92,060 | 0.27 | 24,856 | 1.16 | 0.005 |
| Goldeneye | 3,820 | 0.23 | 871 | 0.84 | 0.097 |

| Species | Irish Population (plus proportion of UK) | Adult baseline mortality rate (Robinson 2005, Horswill 2015) | Irish population baseline mortality | Annual collision rate (cumulative) | Population baseline mortality rate increase (%) |
|-------------------------------|--|--|-------------------------------------|------------------------------------|---|
| Great crested grebe | 2,930 | 0.28 | 806 | 0.40 | 0.049 |
| Great northern diver | 2,240 | 0.16 | 358 | 0.04 | 0.012 |
| Greenland white-fronted goose | 9,590 | 0.28 | 2,647 | 0.10 | 0.004 |
| Greenshank | 1,320 | 0.26 | 343 | 0.02 | 0.006 |
| Grey plover | 2,940 | 0.14 | 412 | 0.04 | 0.010 |
| Hen harrier | 222 | 0.19 | 42 | 0.02 | 0.050 |
| Knot | 16,270 | 0.16 | 2,587 | 0.19 | 0.007 |
| Lapwing | 84,690 | 0.30 | 24,984 | 1.36 | 0.005 |
| Long-tailed duck | 38 | 0.28 | 11 | 0.01 | 0.113 |
| Mallard | 28,230 | 0.37 | 10,530 | 10.45 | 0.099 |
| Merlin | 4,128 | 0.38 | 1,569 | 0.66 | 0.042 |
| Oystercatcher | 60,540 | 0.12 | 7,265 | 0.88 | 0.012 |
| Pintail | 1,570 | 0.34 | 529 | 0.33 | 0.062 |
| Pochard | 11,150 | 0.35 | 3,903 | 3.65 | 0.094 |
| Purple sandpiper | 660 | 0.21 | 135 | 0.01 | 0.006 |
| Red-breasted merganser | 2,430 | 0.18 | 437 | 0.49 | 0.113 |
| Redshank | 23,800 | 0.26 | 6,188 | 0.31 | 0.005 |
| Red-throated diver | 770 | 0.16 | 123 | 0.02 | 0.013 |
| Ringed plover | 11,660 | 0.23 | 2,658 | 0.14 | 0.005 |
| Ruff | 39 | 0.48 | 19 | 0.00 | 0.000 |
| Sanderling | 8,420 | 0.17 | 1,431 | 0.10 | 0.007 |
| Scaup | 2,485 | 0.52 | 1,292 | 0.45 | 0.035 |
| Shelduck | 10,160 | 0.11 | 1,158 | 1.70 | 0.147 |
| Short-eared owl | 7,440 | 0.31 | 2,306 | 0.62 | 0.027 |
| Shoveler | 2,240 | 0.42 | 941 | 0.74 | 0.079 |
| Slavonian grebe | 42 | 0.18 | 8 | 0.00 | 0.053 |
| Snipe | 3,052,500 | 0.52 | 1,587,300 | 56.89 | 0.004 |
| Teal | 35,740 | 0.47 | 16,798 | 9.64 | 0.057 |

| Species | Irish Population (plus proportion of UK) | Adult baseline mortality rate (Robinson 2005, Horswill 2015) | Irish population baseline mortality | Annual collision rate (cumulative) | Population baseline mortality rate increase (%) |
|--------------|--|--|-------------------------------------|------------------------------------|---|
| Tufted duck | 27,470 | 0.29 | 7,966 | 5.19 | 0.065 |
| Turnstone | 9,480 | 0.14 | 1,327 | 0.14 | 0.010 |
| Whimbrel | 53 | 0.11 | 6 | 0.00 | 0.000 |
| Whooper swan | 15,370 | 0.20 | 3,059 | 1.68 | 0.055 |
| Wigeon | 55,730 | 0.47 | 26,193 | 11.43 | 0.044 |

15.9.9.3 Significance of the effect

Overall, it is predicted that the sensitivity of migratory birds is medium at worst and the magnitude of the impact is negligible. The medium sensitivity and negligible magnitude of the impact on migratory birds results in an imperceptible effect at worst, which is not significant effect in EIA terms based on the matrix approach in Table 15.8 of the 2024 EIAR.

Tier 1 and Tier 2

No Tier 2 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for migratory species.

Tier 1, 2 and 3 (All tiers)

No Tier 2 and 3 projects have been scoped into the offshore and intertidal ornithology cumulative effects assessment. As such there is no change in the conclusion of significant effect for all migratory species.

15.9.10 Summary of Impacts

Cumulative Impact 5: Migratory Collision Risk has been introduced in this section, and the significance of effect has been revised accordingly for those impacts to which it applies.

An overview of the significant of potential cumulative effects is provided in below.

Table A15.101 Overview of the significance of potential cumulative effects

| Potential Impact | Significance of Effect – Project Option 1 | Significance of Effect – Project Option 2 |
|---|---|---|
| Disturbance and displacement (construction) | Guillemot <ul style="list-style-type: none"> Slight (Tier 1) Razorbill <ul style="list-style-type: none"> Slight (Tier 1) Puffin <ul style="list-style-type: none"> Imperceptible (Tier 1) Manx shearwater <ul style="list-style-type: none"> Imperceptible (Tier 1) Gannet <ul style="list-style-type: none"> Imperceptible (Tier 1) Kittiwake <ul style="list-style-type: none"> Imperceptible (Tier 1) | Guillemot <ul style="list-style-type: none"> Slight (Tier 1) Razorbill <ul style="list-style-type: none"> Slight (Tier 1) Puffin <ul style="list-style-type: none"> Imperceptible (Tier 1) Manx shearwater <ul style="list-style-type: none"> Imperceptible (Tier 1) Gannet <ul style="list-style-type: none"> Imperceptible (Tier 1) Kittiwake <ul style="list-style-type: none"> Imperceptible (Tier 1) |
| Disturbance and displacement (operation) | Guillemot <ul style="list-style-type: none"> Slight (Tier 1) Razorbill <ul style="list-style-type: none"> Slight (Tier 1) | Guillemot <ul style="list-style-type: none"> Slight (Tier 1) Razorbill <ul style="list-style-type: none"> Slight (Tier 1) |

| Potential Impact | Significance of Effect – Project Option 1 | Significance of Effect – Project Option 2 |
|---|--|--|
| | Puffin <ul style="list-style-type: none"> • Imperceptible (Tier 1) Manx shearwater <ul style="list-style-type: none"> • Imperceptible (Tier 1) Gannet <ul style="list-style-type: none"> • Imperceptible (Tier 1) Kittiwake <ul style="list-style-type: none"> • Imperceptible (Tier 1) | Puffin <ul style="list-style-type: none"> • Imperceptible (Tier 1) Manx shearwater <ul style="list-style-type: none"> • Imperceptible (Tier 1) Gannet <ul style="list-style-type: none"> • Imperceptible (Tier 1) Kittiwake <ul style="list-style-type: none"> • Imperceptible (Tier 1) |
| Collision risk | Kittiwake <ul style="list-style-type: none"> • Moderate (Tier 1) Common gull <ul style="list-style-type: none"> • Moderate (Tier 1) Great black-backed gull <ul style="list-style-type: none"> • Moderate (Tier 1) Herring gull <ul style="list-style-type: none"> • Moderate (Tier 1) Lesser black-backed gull <ul style="list-style-type: none"> • Moderate (Tier 1) Roseate tern <ul style="list-style-type: none"> • Imperceptible (Tier 1) Common tern <ul style="list-style-type: none"> • Imperceptible (Tier 1) Arctic tern <ul style="list-style-type: none"> • Imperceptible (Tier 1) Gannet <ul style="list-style-type: none"> • Imperceptible (Tier 1) | Kittiwake <ul style="list-style-type: none"> • Moderate (Tier 1) Common gull <ul style="list-style-type: none"> • Moderate (Tier 1) Great black-backed gull <ul style="list-style-type: none"> • Moderate (Tier 1) Herring gull <ul style="list-style-type: none"> • Moderate (Tier 1) Lesser black-backed gull <ul style="list-style-type: none"> • Moderate (Tier 1) Roseate tern <ul style="list-style-type: none"> • Imperceptible (Tier 1) Common tern <ul style="list-style-type: none"> • Imperceptible (Tier 1) Arctic tern <ul style="list-style-type: none"> • Imperceptible (Tier 1) Gannet <ul style="list-style-type: none"> • Imperceptible (Tier 1) |
| Combined collision risk and displacement risk | Gannet <ul style="list-style-type: none"> • Slight (Tier 1) | Gannet <ul style="list-style-type: none"> • Imperceptible (Tier 1) |
| Migratory collision risk | Migratory birds <ul style="list-style-type: none"> • Imperceptible (Tier 1) | Migratory birds <ul style="list-style-type: none"> • Imperceptible (Tier 1) |

15.10 References

For clarity, Section 15.10 has been updated to include all references from the 2024 EIAR and the references cited throughout this document.

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