Bellrock Offshore Wind Farm

Wind Farm Development Area

Environmental Impact Assessment Report - Volume II

Chapter 10: Offshore Ornithology

Date: April 2026

Document Number: RHDV_BEL_CST_REP_0002_011

Revision Number: 1

Classification: Public

Revision History

Rev.	Prepared By	Checked By	Approved By	Date
1	Haskoning	SA	BMcG	01/04/26

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Contents

List of Tables

List of Appendices (Volume IV)

Glossary of Terminology

Term	Definition
Air gap	The lowest blade tip point of a wind turbine generator to sea clearance distance (see individual chapters for the relevant tidal levels).
Applicant	Bellrock Offshore Wind Farm Limited, the legal entity submitting Section 36 Consent and Marine Licence applications for the Bellrock Wind Farm Development Area.
Bellrock Offshore Wind Farm (or the Bellrock Project	An offshore wind farm capable of exporting up to 1.8 GW of renewable energy to the National Electricity Transmission System. The Wind Farm Development Area is located 120 km east of Stonehaven, and will connect to the National Electricity Transmission System at the proposed SSEN Transmission Hurlie substation, west of Stonehaven in Aberdeenshire. The Bellrock Offshore Wind Farm comprises of the following Development Areas: ▪ Wind Farm Development Area; ▪ Offshore Transmission Development Area; and ▪ Onshore Transmission Development Area.
Biologically defined minimum population scale (BDMPS)	The estimated population size of a species within a defined biogeographic area during a biologically relevant season, as defined by Furness (2015). For many seabird species present in UK waters there are two defined biogeographic areas; UK Western waters and UK North Sea and Channel. However, some species have different defined BDMPS areas, dependent on the distribution and movements of the species population through the year. Furness (2015) defines the BDMPS for non-breeding seasons; the breeding season BDMPS is defined as the breeding population within foraging range from the project, plus non-breeders and immatures.
Collision Risk Modelling	Collision risk modelling (CRM) refers to the process of estimating the likelihood of seabirds colliding with wind turbines, which can lead to injury or death. This modelling is crucial for assessing the impact of offshore wind developments on seabird populations and is guided by the Joint advice note from Statutory Nature Conservation Bodies (SNCBs) and other advisory bodies. The model takes into account various factors such as flight heights, flight agility, and the degree to which birds avoid turbines or wind farms. It aims to predict the number of seabirds expected to collide with a proposed windfarm each year, helping to understand the estimated collision risk and inform environmental assessments.
Commencement of construction	Commencement of construction to install the Wind Farm Infrastructure as authorised by the Wind Farm Development Area Section 36 Consent and Marine Licence (excluding site preparation works) being the earlier of: ▪ Intrusive pre-installation surveys; ▪ Placement on or installation in the seabed of anchors and associated scour protection, and mooring lines; ▪ Trench excavation for inter-array cables; or ▪ Trenching for, or laying of inter-array cables on or in the seabed.

Term	Definition
Confidence Interval	A range of values, derived from sample data, that is likely to contain the true value of an unknown population parameter. It is expressed with an associated confidence level (e.g. 95%), which indicates the probability that the interval includes the parameter. Confidence intervals provide a measure of uncertainty around an estimate.
Development Area	For consenting purposes, the area for which separate consents and/or Marine Licences will be sought by the Applicant, comprising: ▪ Wind Farm Development Area; ▪ Offshore Transmission Development Area; and ▪ Onshore Transmission Development Area.
Likely Significant Effect (LSE)	In the context of Habitats Regulations Appraisal (HRA) screening, a 'likely significant effect' indicates that there is a risk or possibility that a project could affect the conservation objectives of a designated feature. LSE does not indicate that an adverse effect is likely to occur, but rather that there is a real risk or possibility that an effect may occur.
Migration free breeding season	The breeding season for migratory seabird species is defined as a wider breeding season and a narrower window known as the migration free breeding season. In a given species, the timing of breeding will vary depending on the location of the breeding area; with the start of breeding usually later in more northerly locations. Thus, while birds at some colonies are beginning to nest, others may still be migrating to breeding sites. A core or migration free breeding season is defined as the period when all or the majority of breeding adults of a given species are present at breeding colonies.
Offshore Development Area	The area comprising of: ▪ Wind Farm Development Area; and ▪ The Offshore Transmission Development Area.
Operational life	The expected operational life of the Wind Farm Infrastructure from the Commercial Operation Date to the first floating offshore unit being decommissioned.
Project design envelope	Includes all relevant technical, spatial and temporal elements of the Wind Farm Infrastructure, and the proposed methodology to be employed for construction, operations and maintenance, and decommissioning.
PVA	Population viability analysis (PVA) is a species-specific method of risk assessment used in conservation biology. It determines the probability of a population going extinct within a given number of years and integrates ecological and statistical methods to forecast population health and extinction risk. Each PVA is unique and developed for a specific target population or species, aiming to ensure long-term sustainability.
Scour protection	Protective material positioned around anchors to avoid sediment being eroded as a result of the flow of water.

Term	Definition
Site preparation works	Preparatory activities undertaken within the Wind Farm Development Area prior to the commencement of construction of the Wind Farm Infrastructure, which may comprise (and which may require separate consents): ▪ Geophysical surveys, geotechnical surveys, and non-archaeological/archaeological diver/ remotely operated vehicle surveys; ▪ Seabed preparation including sand wave levelling, slope levelling for gravity based anchors (if selected), boulder clearance, and pre-lay grapnel runs; ▪ Unexploded ordnance survey and/or clearance; ▪ Debris clearance; and ▪ Out of service cable/pipeline removal.
SSEN Transmission Hurlie substation	The onshore substation to be developed by SSEN Transmission, which will receive renewable electricity from the Bellrock Project onshore substation and allow supply of renewable electricity from the wind farm to the National Electricity Transmission System.
Wind Farm Development Area	The boundary within which the Wind Farm Infrastructure will be constructed, operated and maintained, and decommissioned.
Wind farm infrastructure	Infrastructure located within the Wind Farm Development Area including wind turbine generators; floating substructures, station keeping systems and associated scour protection; inter-array cables and associated cable protection; subsea cable hubs; and ancillary infrastructure including buoys (including activities associated with the Wind Farm Infrastructure construction, operation and maintenance, and decommissioning).
Wind turbine generator	A wind turbine generator converts wind energy into electrical energy. The main components include rotor assembly (composed of three blades and a hub); nacelle (containing the generator, shaft and gearbox, power electronic converter and transformer); and a tower (containing lifting equipment and switchgear).

Glossary of Abbreviations

Term	Definition
ADD	Acoustic deterrent device
AEoSI	Adverse effect on site integrity
AR	Avoidance rate
BDMPS	Biologically defined minimum population scales
BoCC	Birds of Conservation Concern
BTO	British Trust for Ornithology
CAA	Civil Aviation Authority
CEA	Cumulative effect assessment
CEF	Cumulative effects framework
CI	Confidence Interval
CIA	Cumulative impact assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CMS	Construction Method Statement
CPGR	Counterfactual population growth rate
CPS	Counterfactual population size
CRH	Collision risk height
CRM	Collision risk model
DAS	Digital Aerial Surveys
DP	Decommissioning Programme
DSLP	Development Specification and Layout Plan
EEA	European Economic Area
EIA	Environmental impact assessment
EMF	electromagnetic fields
EMP	Environmental Management Plan
ERCoP	Emergency Response Cooperation plan
EU	European Union
FOU	Floating offshore unit

Term	Definition
FSS	Floating substructure
GSD	Ground Sample Distance
HPAI	Highly Pathogenic Avian Influenza
HRA	Habitats Regulations Appraisal
IAC	Inter-array cables
JNCC	Joint Nature Conservation Committee
km	Kilometres
LMP	Lighting and Marking Plan
MARPOL	International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
mCRM	Migratory collision risk model
MD-LOT	Marine Directorate - Licensing Operations Team
MGN	Marine Guidance Note
MHWS	Mean high water springs
MMMP	Marine Mammal Mitigation Protocol
MPCP	Marine Pollution Contingency Plan
MW	Megawatt
NEEOG	North East and East Ornithology Group
NESO	National Energy System Operator
NLB	Northern Lighthouse Board
NSP	Navigational Safety Plan
O&M	Operation and maintenance
OASA	offshore aerial survey area
OFEC	Offshore export cable
OfSS	Offshore substation
OfTDA	Offshore Transmission Development Area
OMP	Operation and Maintenance Plan
ONEC	Onshore export cable

Term	Definition
OnTDA	Onshore Transmission Development Area
ORSA	Offshore Regional Study Area
OSP	Offshore substation platform
OWF	Offshore Windfarm
OWF	Offshore wind farm
PEMP	Project Environmental Monitoring Programme
PTS	Permanent threshold shift
PVA	Population viability analysis
RHDHV	Royal HaskoningDHV (now Haskoning)
RIAA	Report to Inform Appropriate Appraisal
ROV	Remotely operated vehicle
RSPB	Royal Society for the Protection of Birds
sCRM	Stochastic Collision Risk Model
SD	Standard Deviation
SKS	station keeping systems
SMP	Seabird Monitoring Programme
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSC	Suspended sediment concentration
UK	United Kingdom
UXO	Unexploded ordnance
VMNSP	Vessel Management and Navigational Safety Plan
VMP	Vessel Management Plan
WFDA	Wind Farm Development Area
WTG	Wind turbine generator

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10 Offshore Ornithology

10.1 Introduction

1. This Chapter of the Bellrock Wind Farm Development Area (WFDA) Environmental Impact Assessment (EIA) Report presents an assessment of potential effects on offshore ornithology from the construction, operation and maintenance (O&M), and decommissioning phases of the Bellrock Wind Farm Infrastructure.

2. The Bellrock Wind Farm Infrastructure comprises wind turbine generators (WTGs); floating substructures (FSSs), station keeping systems (SKSs) and associated scour protection; inter-array cables (IACs) and associated cable protection; and subsea cable hubs. Further detail on the Bellrock Wind Farm Infrastructure is provided in **Chapter 4: Project Description (Volume II).**

3. This Chapter of the Bellrock WFDA EIA Report has been prepared to provide the Marine Directorate - Licensing and Operations Team (MD-LOT) (on behalf of the Scottish Ministers) and stakeholders with sufficient information to determine the potential effects of the Bellrock Wind Farm Infrastructure on offshore ornithology receptors.

4. This Chapter should be read in conjunction with the following chapters of the Bellrock WFDA EIA Report:

- **Chapter 6: Marine Geology, Oceanography and Marine Processes (Volume II)**;
- **Chapter 7: Benthic Ecology (Volume II)**; and
- **Chapter 8: Fish and Shellfish Ecology (Volume II)**.

5. The offshore ornithology assessment is likely to have key inter-relationships with the above receptors, which will be considered appropriately throughout this Bellrock WFDA EIA Report.

6. Additional information to support the offshore ornithology assessment includes:

- **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)**;
- **Appendix 10.2: Offshore Ornithology Collision Risk Modelling Technical Report (Volume IV)**;
- **Appendix 10.3: Offshore Ornithology Displacement Assessment Technical Report (Volume IV)**;
- **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)**;
- **Appendix 10.5: Offshore Ornithology Apportioning Technical Report (Volume IV)**; and
- **Appendix 10.6: Bird Species Scientific Names (Volume IV)**.

7. This Chapter was prepared by Haskoning. All species within this Chapter are referred to using their English names (refer to **Appendix 10.6 (Volume IV)** for bird species' scientific names).

10.2 Legislation, Policy and Guidance

8. **Table 10.1** describes the legislation, policy and guidance which have been considered in the preparation of this Chapter. The overarching policy and legislation relevant to the Bellrock WFDA is described in **Chapter 2: Policy and Legislative Context (Volume II)**.

9. Any legislation referred to in this EIA Report is as subsequently amended and as currently in force as at the date of this EIA Report.

Table 10.1: Summary of Relevant Legislation, Policy and Guidance for Offshore Ornithology

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
Legislation	
The Habitats Regulations: ▪ The Conservation (Natural Habitats and c.) Regulations 1994; ▪ The Conservation of Offshore Marine Habitats and Species Regulations 2017; and ▪ The Conservation of Habitats and Species Regulations 2017.	The 'Habitats Regulations' comprise a number of legislative instruments that transpose EU Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive') and the Wild Birds Directive (2009/147/EC) into domestic law. The EU Directives are transposed into domestic law by a number of Regulations. Those relevant to the WFDA consent applications are the Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017. The Habitats Regulations cover the requirements for: ▪ Protecting sites that are internationally important for threatened habitats and species – i.e. European Sites; and ▪ A legal framework for species requiring strict protection – i.e. European protected species. The Habitats Regulations have been amended in Scotland, most recently in 2019 as a result of the United Kingdom (UK) leaving the EU, although it is noted that the requirements of Habitats Regulations are substantially unaffected by EU exit. Amendments have also been made to the Conservation of Habitats and Species Regulations 2017. The Conservation of Habitats and Species Regulations 2017 apply in Scotland in relation to certain specific activities (reserved matters), including consents granted under Sections 36 and 37 of the Electricity Act 1989. The Conservation of Offshore Marine Habitats and Species Regulations 2017 apply to Marine Licence applications in the Scottish offshore region (more than 12 nm from land). Assessment under the Habitats Regulations is considered in the **Bellrock WFDA Shadow Habitats Regulations Appraisal (HRA) (Volume VI)**.

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
The Wildlife and Countryside Act 1981.	The Wildlife and Countryside Act 1981 is the primary legislation protecting animals, plants and certain habitats in the UK, including all wild birds and their nests, eggs and chicks. This Bellrock WFDA EIA provides information to public bodies and office holders to enable them to fulfil their obligations under the Act.
Policy	
Scotland's National Marine Plan (2015) Part 1: Objectives and Marine Planning Policies	
Sustainable development of offshore wind, wave and tidal renewable energy in the most suitable locations.	The location of the Bellrock WFDA is discussed in **Chapter 3: Site Selection and Consideration of Alternatives (Volume II)**.
Policy GEN 9 Natural heritage. Development and use of the marine environment must: ▪ Comply with legal requirements for protected areas and protected species; ▪ Not result in significant impact on the national status of Priority Marine Features; and ▪ Protect and, where appropriate, enhance the health of the marine area.	The **Bellrock WFDA Shadow HRA (Volume VI)** sets out the assessment of effects on marine SPAs. The **Bellrock WFDA Shadow HRA Derogation Case (Volume VI)** sets out any required measures to compensate potential adverse effects on qualifying features and hence ensure that the integrity of the National Site Network is maintained. No ornithological features are classified as Priority Marine Features and so they are not discussed further in this Chapter but may be considered in other Chapters as necessary.
Living within Environmental Limits: A strategic approach to mitigating potential impacts and cumulative impacts on the marine environment forms an integral part of marine planning and decision making, whilst issues arising in the coastal interface should align between marine and terrestrial processes.	**Section 10.9** sets out the Cumulative Effects Assessment (CEA), which assesses the cumulative effects of the Bellrock Wind Farm Infrastructure together with other projects.
Guidance	
NatureScot (2018). Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in Special Protection Areas (SPAs).	These guidance documents have been applied throughout the EIA, as appropriate. Any deviations from standard guidance have been discussed and agreed with NatureScot and/or MD-LOT as appropriate, as presented in **Table 10.2**.
NatureScot (2025a) Guidance Note 1: Guidance to support Offshore Wind Applications: Marine Ornithology – Overview.	
NatureScot (2023a). Guidance Note 2: Guidance to support Offshore Wind Applications: Advice for Marine Ornithology Baseline Characterisation Surveys and Reporting.	

Relevant Legislation, Policy or Guidance	Relevance to the Assessment
NatureScot (2023b). Guidance Note 3: Guidance to support Offshore Wind applications: Marine Birds - Identifying theoretical connectivity with breeding site SPAs using breeding season foraging ranges.	
NatureScot (2023c). Guidance Note 4: Guidance to Support Offshore Wind Applications: Marine Ornithology – Determining Connectivity of Marine Birds with Marine SPAs and Breeding Seabirds from Colony SPAs in the Non-Breeding Season.	
NatureScot (2023d). Guidance Note 5: Guidance to support Offshore Wind Applications: Recommendations for marine bird population estimates.	
NatureScot (2023e). Guidance Note 6: Guidance to support Offshore Wind Applications - Marine Ornithology Impact Pathways for Offshore Wind Developments.	
NatureScot (2025b) Guidance Note 7: Guidance to support Offshore Wind Applications: Marine Ornithology - Advice for assessing collision risk of marine birds.	
NatureScot (2023f). Guidance Note 8: Guidance to support Offshore Wind Applications: Marine Ornithology Advice for assessing the distributional responses, displacement and barrier effects of Marine birds.	
NatureScot (2020). Guidance Note 9: Guidance to support Offshore Wind Applications: Seasonal periods for Birds in the Scottish Marine Environment.	
NatureScot (2023g). Guidance Note 11: Guidance to support Offshore Wind Applications: Marine Ornithology - Recommendations for Seabird Population Viability Analysis (PVA).	
Statutory Nature Conservation Body (SNCB) (2024). Joint advice notes from the SNCBs regarding bird collision risk modelling for offshore wind developments. Joint Nature Conservation Committee (JNCC), Peterborough.	

10.3 Consultation

10. Consultation undertaken to date for the Bellrock WFDA relevant to offshore ornithology has been in line with the general process described in **Chapter 6: Environmental Impact Assessment Methodology (Volume II)**. Key consultation pertinent to this Offshore Ornithology Chapter is provided in **Table 10.2**.

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Table 10.2: Consultation Relevant to Offshore Ornithology

Consultee	Document/Date	Comment	How/Where Comment is Addressed
NatureScot and Marine Directorate	Consultation on Method Statements for offshore digital aerial surveys (DAS) was undertaken with NatureScot and MD-LOT (MS-LOT at the time) in February to March 2022.	Advice was given on the focal species and alignment of DAS approaches with those for adjacent wind farm developments to facilitate future CEA.	Comments from NatureScot and MD-LOT were considered in the scope of works for the offshore aerial survey. For further details, see: ▪ **Section 10.5.2.1** (for details on site-specific surveys); ▪ **Section 10.6.1** (for details on baseline digital aerial surveys); and ▪ **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV).**
NatureScot	Minutes of Bellrock WFDA Scoping Workshop held on 30 October 2023.	NatureScot confirmed that the Berwick Bank Offshore Wind Farm Project approach for herring gull to determine non-breeding season connectivity should be followed (i.e. the breeding season foraging range should be used).	Non-breeding season connectivity is based on breeding season foraging range for herring gull as per NatureScot advice. For further details, see: ▪ **Section 10.6.1.4** (for regional population estimates) and **Table 10.16** (for breeding and non-breeding reference populations for seabird species).
NatureScot	Minutes of Bellrock WFDA Scoping Workshop held on 30 October 2023.	NatureScot to provide confirmation on their advised approach to determining connectivity and estimating apportioning for puffin in the non-breeding season.	Concluded at email from NatureScot of 19 July 2024, that non-breeding season impacts on puffin should be assessed quantitatively in EIA but only qualitatively in HRA. A non-breeding assessment is undertaken for puffin using annual mortality with a regional reference population. For further details, see **Section 10.8.2.3.2.4**. In addition, non-breeding season effects on puffin are assessed qualitatively within the **Bellrock WFDA Shadow HRA (Volume VI)**.
NatureScot	Minutes of Bellrock WFDA Scoping Workshop held on 30 October 2023.	NatureScot confirmed that advised displacement rates provided in guidance for use with the matrix approach are the rates that are advised for use with SeabORD.	Rates advised by NatureScot have been used for the displacement assessment. For further details, see **Section 10.8.2.3**.

Consultee	Document/Date	Comment	How/Where Comment is Addressed
NatureScot	Minutes of Bellrock WFDA Scoping Workshop held on 30 October 2023.	NatureScot confirmed that collision risk Guidance Note 7, due to be updated at the end of December 2023, would include recommended updates to avoidance rates to be used in Collision Risk Modelling, and will no longer include recommendation to use Collision Risk Model (CRM) output option 3. NatureScot advised that any gaps in recommended parameters for use in CRM can be covered by direct correspondence between NatureScot and the Project.	Further correspondence with NatureScot on CRM parameters was initiated at a meeting between Applicant and NatureScot on 19 June 2024, with advice on the CRM parameters provided in emails from NatureScot of 12 July 2024 and 19 July 2024, and subsequent agreement in email from NatureScot of 10 December 2024 that the CRMs should use the avoidance rates as presented in the '*Joint advice note from the Statutory Nature Conservation Bodies (SNCBs) regarding bird collision risk modelling for offshore wind developments'* which was published in late 2024, see below.
NatureScot	Minutes of Bellrock WFDA Scoping Workshop held on 30 October 2023.	NatureScot confirmed that for CRM, it recommends using the 2022 update to the Stochastic Collision Risk Model (sCRM) Shiny App, which is based on the stochLAB package. NatureScot confirmed that it will look at both the deterministic and stochastic outputs in the round and both would be considered in process of determining effects.	Collision risk modelling has used the updated shiny app (Caneco, 2022), with both deterministic and stochastic outputs presented in **Appendix 10.2**. For further details, see: ▪ **Section 10.8.2.5;** and ▪ **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV).**
NatureScot	Minutes of Bellrock WFDA Scoping Workshop held on 30 October 2023.	In CRM for gannet NatureScot will accept macro-avoidance in non-breeding season, but their advice will be that it should not be included in breeding season collision estimation. This is due to the NatureScot view that the evidence base for the occurrence of macro-avoidance (or at least the level of macro-avoidance) is weaker for the breeding season than for the non-breeding season, and the advice is provided with account taken of the recently published Natural England commissioned review of macro-avoidance by gannet.	Macro-avoidance is applied in non-breeding season but not in the breeding season for gannet collision risk modelling. For further details, see **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV).**
NatureScot	Minutes of Bellrock WFDA Scoping Workshop held on 30 October 2023.	NatureScot raised the issue of the option that the Applicant has to undertake the assessment according to their guidance and also, according to variations to that guidance if the Applicant considers that there is a justifiable basis for doing this. Should such a route be taken in the assessment for the project, NatureScot	The Applicant has sought to follow NatureScot guidance, and advice received during consultation, throughout the assessment. The approach used has been set out in relevant sections in this report, and also in more detail in the accompanying **Appendices 10.1** to **10.5 (Volume IV)**.

Consultee	Document/Date	Comment	How/Where Comment is Addressed
		requested that for any departure from guidance or roadmap agreed approaches, that this is transparently/clearly presented in the EIA Report, and be discussed with NatureScot (noting that Berwick Bank was an enormous assessment which adopted different approaches but that it was produced in such a way that it was easy to follow the rationale/methods adopted).	
NatureScot	Email dated 20 December 2023, follow-up on meeting minutes from the Bellrock WFDA Scoping Workshop held on 30 October 2023 (review on action points, outstanding questions and provide further advice).	NatureScot advised they are reviewing their position on non-breeding season assessments for puffin and will provide further guidance in due course. They also confirmed that Collision Risk Guidance Note 7 is still being updated, with publication expected in Q1 2024.	Concluded at email from NatureScot of 19 July 2024, see below. For further details, see **Section 10.8.2.3.2.4**.
NatureScot	Email, 10 July 2024, NatureScot advice on Bellrock 2-year DAS report (HiDef, 2024).	Overall, NatureScot considered the 2-year DAS report has been produced to a high standard and clearly shows the results from the two years of data collection. The survey methodology is generally as expected. Surveys have been carried out by HiDef. In line with NatureScot's guidance, monthly surveys across two years have been undertaken (from March 2022 to February 2024). The DAS covers the WFDA and a 4 km buffer. The survey area has been covered by transects 2.5 km apart with a flying height of 550 m and a 2 cm Ground Sample Distance (GSD). The survey coverage was 10%. NatureScot noted that, as highlighted in Table 3 of the 2-year DAS Report, for March 2022 and June 2023, 14 transects have been analysed compared to the 15	The survey approach accords with NatureScot (2023a) guidance. In respect of the difference in transect numbers between surveys this was due to the omission of a small (1.5 km) transect on the periphery of the northwest of the Offshore Aerial Survey Area (OASA) during the March 2022 and June 2023 surveys. During these two surveys the flight path of the northwest transect was slightly outside the OASA, leading to its omission. For further details, see Section 2.1 and Table 2.1 of **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV).**

Consultee	Document/Date	Comment	How/Where Comment is Addressed
		transects analysed for other months. NatureScot request that commentary is provided to further explain the rationale regarding why fewer transects have been analysed in March 2022 and June 2023, both for transparency and to address if or how this might impact the assessment.	
NatureScot	Email, 10 July 2024, NatureScot advice on Bellrock 2-year DAS report (HiDef 2024)	NatureScot remarked there is a marked difference between the number of birds seen in Year 1 and Year 2 of the surveys, notably amongst the auks and also for kittiwake. The Applicant highlighted these findings to NatureScot prior to circulation of the 2-year DAS report. The between-year differences in estimated abundances of key species were also discussed at the meeting on 19 June 2024 (meeting minutes item 3). Tables 5 and Table 7 of the 2-year DAS Report show a decrease in guillemot numbers in Year 2, with a Year 1 total of 3,124 recorded in Table 5 and a Year 2 total of 405 recorded in Table 7. Although recorded in lower numbers overall, razorbill and puffin show a similar pattern. The peak in 2022 occurs within the large auk (common guillemot and razorbill) post-breeding dispersal season (approximately July - October), with large aggregations of birds often appearing offshore during these months. This post-breeding period is when fledged young remain dependent upon their parent - guillemot and razorbill also moult during this period and are therefore flightless. Aggregations like these have been noted within other offshore wind farm surveys along the East coast, however, there is limited understanding of the drivers behind the post-breeding aggregations that have been observed and whether the same areas are used consistently or by the same individuals, across years.	In relation to the between-year differences in bird abundance and use of the two years of baseline data to inform the assessment, NatureScot confirmed their advice on this subject on 26 July 2024, which supersedes their advice on this subject from 10 July 2024, and stated that the assessment should be based on the two years of baseline data (see below). The population estimates from which reference population sizes are derived are taken from the most recent colony count data in the Seabirds Count national census 2015 - 2021 (Burnell et al. 2023), or from the SMP where more recent data are available, with a very small number of exceptions. The exceptions are instances in which the most recent data are taken from credible reports, with these data not yet available on the SMP at the time of writing. Details of the colony count data that have been used are provided in **Appendix 10.4: Offshore Ornithology Population Viability Analysis Technical Report (Volume IV).** Consideration of the effects of HPAI on the assessment conclusions is presented in **Section 10.6.4.3**. This concludes that the effects of HPAI are unlikely to result in bias or flaws in the findings and conclusions of the Chapter.

Consultee	Document/Date	Comment	How/Where Comment is Addressed
		NatureScot acknowledge that these aggregations are temporary, can be variable in nature and may be influenced by factors such as diet and fish stocks. NatureScot also appreciate that a single survey per month may not pick up the peak aggregations. It is possible that large auks could make use of established currents during this period, defining to some extent their likely locations each year. The Bellrock WFDA is situated in an area where guillemots from colonies along the length of the East coast of Scotland could congregate, suggesting that large aggregations may be likely. NatureScot summarised they have concerns regarding the low number of auks (particularly guillemot) recorded for the July/August auk dispersal period in 2023 relative to 2022 and consider that the 2023 results may not provide representative data. The low numbers of kittiwake reported in 2023 (Year 1 total of 204 recoded in Table 5 and Year 2 total of 36 recorded in Table 7 of the 2-year DAS Report is also of concern and again NatureScot consider that the 2023 results may not provide representative data. NatureScot suggested that the results in 2023 may be due to die off events in guillemots and kittiwakes linked to the Highly Pathogenic Avian Influenza (HPAI) outbreak ongoing at the time of the survey. There was a marked increase in reports of dead and sick birds from June 2023 through to August 2023, with guillemot and kittiwake making up large proportions of the dead birds being recorded. NatureScot is interested in any information the Applicant can provide that might help explain the significant differences in numbers of auks, especially guillemots and kittiwakes, recorded in the two years. Agreement should be reached on the way forward and that this should be agreed with MD-LOT (as noted in the minutes from meeting between NatureScot and Bellrock on 19 June 2024).	

Consultee	Document/Date	Comment	How/Where Comment is Addressed
		As the assessments progress it will be useful to know, for the sites that the development is connected to, what colony count data is being fed into the models and when it was collected. This will be important to know in order to get an understanding of what the development data is being compared to considering the various stochastic events seabirds have faced in recent years, the auk wrecks in 2021 and the ongoing HPAI outbreak.	
NatureScot	Email, 10 July 2024, NatureScot advice on Bellrock 2-year DAS report (HiDef, 2024)	NatureScot noted both section 3.3.8 and section 3.3.9 of the 2-year DAS Report highlight a peak of unidentified terns. Although 16 Arctic terns were identified there were 50 individuals recorded in the Arctic/common tern category which will require further consideration. It will be important to know how the Project plan to apportion these birds and NatureScot request that further detail on this is provided.	Applicant's response in email of 9 September 2024 to NatureScot: Arctic and common terns are historically known challenging birds to identify through DAS due to the small differences in morphological distinctive features. Over the years, the overall experience of the HiDef ID team, and improvements in footage quality, means that the identification of these two species where possible is made with a relatively high degree of confidence. In the Bellrock survey area, no common terns were identified throughout the survey period, therefore all the "arctic/common tern" birds were apportioned to Arctic terns when calculating the apportioned density and population estimates. For further details, see **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report** (Section 3.6) and **Annex B (Volume IV).**
NatureScot	Email, 10 July 2024, NatureScot advice on Bellrock 2-year DAS report (HiDef, 2024)	NatureScot noted in Section 3.3.9 and Figure 58 of the 2-year DAS Report, a high number of unidentified auks were recorded in July 2022 and advised this peak of unidentified auks should also be considered further and detail provided on why the number unidentified for July 2022 was high. NatureScot recommended looking at data from colonies that are connected to the development to see when the dispersal dates were.	The Applicant's responded to NatureScot by email on 9 September 2024: The summer peaks of non-identification relate primarily to difficulties separating razorbill and guillemot and reflect the large number of birds present at that time. These are especially hard to distinguish when birds are in moult and accompanied by juveniles. Razorbills and guillemots are known to lay eggs between mid/late-April and late May, with incubation periods lasting approximately 34 days (Forrester et al. 2007). Once chicks have hatched, parents travel intensively to feed the chicks up until they reach ~3 weeks old, time when the flightless chicks leave the colony accompanied by the male parent. Therefore, the high numbers of auks at-sea in July are to be expected. This is further confirmed when looking at the number of adult/young pairs recorded during the survey period. A total of 227 and 23 adult/young pairs of guillemot and razorbill were recorded respectively in July 2022, and three adults/young pairs of

Consultee	Document/Date	Comment	How/Where Comment is Addressed
			guillemots were recorded in August 2022. Dispersal rates in colonies connected to the development is not information that is generally available, but it might be available for intensively monitored colonies such as Isle of May or Fair Isle. The number of unidentified auks (242) versus the total number of identified auks (1948) in July 2022 provides an identification rate of 87.7%. This figure falls below HiDef's ID rate target of 90% but it is not significantly lower. The overall avian ID rate for the 24 months of survey was 94.26% but there were three months with ID rates of between 85% and 90% (including July 2022). HiDef data from other offshore wind farm sites off Northeast Scotland show comparable identification rates, although July 2022 is a little lower than those reviewed (all sites recorded an identification rate between 90% and approximately 95%). Various factors may contribute to a lower ID rate, particularly weather conditions, although it is not believed to have been a significant factor in this case. HiDef would like to see very high ID rates and strive to update hardware, software, training, and techniques to achieve that. It is unusual but not unknown for HiDef to see large auk ID rates just below 90% but this is increasingly rare. Unidentified auks recorded in July 2022, and other surveys will be apportioned appropriately for each auk species, and their respective density and population estimates, as is the case for all auks where there is not an ID rate of 100%. The Applicant therefore does not consider that the lower ID rate in July 2022 will detrimentally affect the overall data provided for the purposes of assessing auk species for the EIA, and that baseline data are suitable and sufficient to support the assessment.

<table>
<tr><th>Consultee</th><th>Document/Date</th><th>Comment</th><th>How/Where Comment is Addressed</th></tr>
<tr><td>NatureScot</td><td>Email, 10 July 2024, NatureScot advice on Bellrock 2-year DAS report (HiDef, 2024)</td><td>NatureScot noted a total of 165 dead birds have been reported, but from their review only noted a total of 107 dead birds (101 gannet in Table 23, 2 kittiwake in Table 13, 2 guillemot in Table 15, and 2 fulmar in Table 20). Further clarification regarding the number and species of dead birds would be helpful, including if these were unidentified.</td><td>The Applicant responded to NatureScot by email on 9 September 2024: The additional dead birds were recorded amongst the unidentified birds. Please see the table below for the total number of dead birds found during the survey period:

Number of Dead Birds Recorded in the Bellrock Survey Area Between March 2022 and February 2024

<table>
<tr><th>Species</th><th>Total</th></tr>
<tr><td>Fulmar</td><td>2</td></tr>
<tr><td>Gannet</td><td>101</td></tr>
<tr><td>Guillemot</td><td>2</td></tr>
<tr><td>Kittiwake</td><td>2</td></tr>
<tr><td>Lesser black-backed gull</td><td>1</td></tr>
<tr><td colspan="2">Unidentified species</td></tr>
<tr><td>Auk species</td><td>2</td></tr>
<tr><td>Fulmar/gull species</td><td>1</td></tr>
<tr><td>Gull species</td><td>1</td></tr>
<tr><td>Large auk species</td><td>53</td></tr>
<tr><td>GRAND TOTAL</td><td>165</td></tr>
</table>

The high number of dead gannets is likely due to the Highly Pathogenic Avian Influenza (HPAI), which hit most Scottish colonies during the breeding season of 2022 (Falchieri et al. 2022, Tremlett et al. 2024a, 2024b).</td></tr>
<tr><td>NatureScot</td><td>Email, 12 July 2024, response to Bellrock Project: Proposed input parameters for CRM (Memo dates 19 June 2024, PC3637-RHD-OF-XX-ME-SO-0001)</td><td>Agreement that option 2 of the sCRM and option 2 of the deterministic CRM should be run.</td><td>Both deterministic and stochastic models have been undertaken for each species and WTG design scenario that have been considered. In all cases, Option 2 of the model has been used, as advised by NatureScot. For further details, see Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV).</td></tr>
</table>

Consultee	Document/Date	Comment	How/Where Comment is Addressed
NatureScot	Email, 12 July 2024, response to Bellrock Project: Proposed input parameters for CRM (Memo dates 19 June 2024, PC3637-RHD-OF-XX-ME-SO-0001)	NatureScot advised the use of the Caneco (2022) version of the sCRM and the deterministic CRM (with seed specified to enable repeatability).	Following advice received from NatureScot, all collision risk models (CRMs) for the Bellrock WFDA have been run in the Caneco (2022) shiny app. For further details, see **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV).**
NatureScot	Email, 12 July 2024, response to Bellrock Project: Proposed input parameters for CRM (Memo dates 19 June 2024, PC3637-RHD-OF-XX-ME-SO-0001)	NatureScot provided input parameters for the sCRM for Arctic tern, common gull and Arctic skua. Parameters for other species were confirmed to be in line with current NatureScot guidance.	The species input parameters for the CRMs were based upon the recent joint SNCBs collision risk guidance and additional advice provided by NatureScot, as agreed in emails from NatureScot on 12 July 2024, 19 July 2024 and 10 December 2024. For further details, see **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV).**
NatureScot	Email, 12 July 2024, response to Bellrock Project: Proposed input parameters for CRM (Memo dates 19 June 2024, PC3637-RHD-OF-XX-ME-SO-0001)	Confirmed that for species where a range of values for nocturnal activity factor is given, that the central value 0.375 and Standard Deviation (SD) of (0.0637) that results in 0.25 and 0.5 being captured in the 95% should be used.	The species input parameters for the CRMs were based upon the recent joint SNCBs collision risk guidance and additional advice provided by NatureScot, as agreed in emails from NatureScot on 12 July 2024, 19 July 2024 and 10 December 2024. For further details, see **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV).**
NatureScot	Email, 12 July 2024, response to Bellrock Project: Proposed input parameters for CRM (Memo dates 19 June 2024, PC3637-RHD-OF-XX-ME-SO-0001)	NatureScot provided input parameters for the deterministic CRM for Arctic tern, common gull and Arctic skua. Parameters for other species were confirmed to be in line with current NatureScot guidance.	The species input parameters for the CRMs were based upon the recent joint SNCBs collision risk guidance and additional advice provided by NatureScot, as agreed in emails from NatureScot on 12 July 2024, 19 July 2024 and 10 December 2024. For further details, see **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV).**

Consultee	Document/Date	Comment	How/Where Comment is Addressed
NatureScot	Email, 12 July 2024, response to Bellrock Project: Proposed input parameters for CRM (Memo dates 19 June 2024, PC3637-RHD-OF-XX-ME-SO-0001)	NatureScot confirmed agreement to run the sCRM/CRM for gannet with a macro-avoidance rate of 70% applied in the non-breeding periods.	The species input parameters for the CRMs were based upon the recent joint SNCBs collision risk guidance and additional advice provided by NatureScot, as agreed in emails from NatureScot on 12 July 2024, 19 July 2024 and 10 December 2024. For further details, see **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV).**
NatureScot	Email from NatureScot to Applicant on 19 July 2024, response to Bellrock Project: NatureScot advice on: Actions recorded for NatureScot in meeting minutes from the call on 19 June 2024 (document reference: PC3637-RHD-WF-XX-MI-SO-0001; received by email on 20 June 2024) and CRM parameters – final values (document titled: CRM parameters final values 150724; received by email on 16 July 2024)	Meeting Minutes - Item 1 and Item 2 (density estimates): Following discussions during the call on 19 June (as recorded in meeting minute items 1 and 2) and further review of the findings reported in the Bellrock 2-year DAS report, NatureScot are content to accept the use of design-based estimates and advise that in this case it does not require model-based density estimates.	Following advice received from NatureScot, design-based approaches only were used for deriving density estimates for all species except guillemot. Density estimates for guillemot were generated by both approaches, on the basis that guillemot was the most abundant and frequently occurring species in the Bellrock DAS and, therefore, the most suitable species for the application of model-based methods. Following a comparison of the design-based and model-based estimates of guillemot density presented in **Appendix 10.1 (Volume IV)**, no benefit to the use of the model-based densities was identified and hence the assessment for guillemot relies on the design-based estimates. For further details, see **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV).**

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NatureScot	Email from NatureScot to Applicant on 19 July 2024, response to Bellrock offshore Wind Farm: NatureScot advice on: Actions recorded for NatureScot in meeting minutes from the call on 19 June 2024 (document reference: PC3637-RHD-WF-XX-MI-SO-0001; received by email on 20 June 2024) and CRM parameters – final values (document titled: CRM parameters final values 150724; received by email on 16 July 2024)	Meeting Minutes - Item 4 (apportioning for puffin in the non-breeding season): Further to the query raised regarding the assessment of distributional response impacts to puffin during the non-breeding season, this has not typically been undertaken previously due to puffin dispersal patterns post-breeding. However, some sites have now observed a peak of puffin during the dispersal period. For these sites NatureScot can now confirm that a non-breeding season assessment should be undertaken quantitatively through the EIA assessment, i.e. using an annual mortality (breeding season plus non-breeding season) with a regional population. Given the current evidence available, NatureScot advise that this would not be required to be undertaken quantitatively within the HRA. However, NatureScot recommend that this is addressed qualitatively within the conclusions for puffin	A non-breeding assessment is undertaken for puffin using annual mortality with a regional reference population. For further details, see **Section 10.8.2.3.2.4**. In addition, non-breeding season effects on puffin are assessed qualitatively within the **Bellrock WFDA Shadow HRA (Volume VI).**
NatureScot	Email from NatureScot to Applicant on 19 July 2024, response to Bellrock offshore Wind Farm: NatureScot advice on: Actions recorded for NatureScot in meeting minutes from the call on 19 June 2024 (document	Meeting Minutes – Item 4 (second year survey results): Item 4 of the meeting minutes refers to advice to be provided by NatureScot, which has since been included within NatureScot's response to the Bellrock 2-year DAS report (advice issued 10 July 2024). Last week Bellrock provided a table comparing the densities of key species (document titled: Year 1 and 2 Combined + Alone Densities V2.0; received by email on 11 July). Thank you for providing the data in this format, we are currently reviewing the table and accompanying request for NatureScot confirmation regarding the suggested options set out in our response to the Bellrock 2-year DAS report.	COMMENT/ADVICE SUPERSEDED In relation to the between-year differences in bird abundance and use of the two years of baseline data to inform the assessment, NatureScot confirmed their advice on this subject on 26 July 2024, which was that the assessment should be based on the two years of baseline data (see below).

Consultee	Document/Date	Comment	How/Where Comment is Addressed
	reference: PC3637-RHD-WF-XX-MI-SO-0001; received by email on 20 June 2024) and CRM parameters – final values (document titled: CRM parameters final values 150724; received by email on 16 July 2024)	We aim to provide a response to you on this shortly following further discussion between ourselves and colleagues in Marine Directorate. As recorded in the meeting minutes and advised within our written advice on the Bellrock 2-year DAS report, please note that deviations from normal practice will need to be agreed with MD-LOT.	
NatureScot	Email from NatureScot to Applicant on 19 July 2024, response to Bellrock offshore Wind Farm: NatureScot advice on: Actions recorded for NatureScot in meeting minutes from the call on 19 June 2024 (document reference: PC3637-RHD-WF-XX-MI-SO-0001; received by email on 20 June 2024) and CRM parameters – final values (document titled: CRM parameters final values 150724; received by email on 16 July 2024)	Meeting Minutes – Item 5 (CRM parameters): NatureScot advice regarding this action was issued on 12 July 2024. NatureScot note the email from Bellrock, as received on 16 July, which details the final input parameters proposed for the Bellrock CRM (document titled: CRM parameters final values 150724) and provide advice below.	CRM parameters were based upon the recent joint SNCBs collision risk guidance and additional advice provided by NatureScot, as agreed in emails from NatureScot on 12 July 2024, 19 July 2024 and 10 December 2024. For further details, see: ▪ **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV);** and ▪ **Section 10.8.2.5**.

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NatureScot	Email from NatureScot to Applicant on 19 July 2024, response to Bellrock offshore Wind Farm: NatureScot advice on: Actions recorded for NatureScot in meeting minutes from the call on 19 June 2024 (document reference: PC3637-RHD-WF-XX-MI-SO-0001; received by email on 20 June 2024) and CRM parameters – final values (document titled: CRM parameters final values 150724; received by email on 16 July 2024)	NatureScot advice – CRM parameters final values: NatureScot have reviewed the CRM parameters – final values, shared by email on 16 July 2024 (document titled: CRM parameters final values 150724) and note the request for confirmation included within this email (as copied in below). "Please could NatureScot confirm that they are content that these are the final values that we will use in our modelling and acknowledge that any new guidance/changes to guidance will not be updated/included in our modelling and assessment once our modelling has commenced." NatureScot confirm that they are content the values provided (as per document: CRM parameters final values 150724) reflect the recent advice provided to Bellrock. NatureScot is aware of the importance of timescales and the need to have cut off points for additional information, therefore we also confirm that should NatureScot's collision risk guidance note be updated after Bellrock have started undertaking the relevant modelling they are not required to include the updates.	CRM parameters were based upon the recent joint SNCBs collision risk guidance and additional advice provided by NatureScot, as agreed in emails from NatureScot on 12 July 2024, 19 July 2024 and 10 December 2024. For further details, see: ▪ **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV);** and ▪ **Section 10.8.2.5**.
NatureScot	Email from NatureScot to Applicant on 26 July 2024. Response to table comparing the densities of key species of seabird (document titled: Year 1 and 2 Combined + Alone Densities V2.0; received on 11 July),	Following a review of the year 1 and year 2 combined and alone densities, NatureScot advise that both year 1 and 2 are used to derive values for the baseline for Bellrock, acknowledging there is substantial variability observed in the densities, which is likely to reflect recent mass mortality events, and that there are uncertainties around the long-term effects of these. NatureScot therefore recommend that the assessment also includes commentary on this observed variability and any implications for the assessment. NatureScot	Year 1 and 2 densities are used to derive baseline values for the Bellrock WFDA. For further details, see: ▪ **Section 10.6.1.1**; and ▪ **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV).**

Consultee	Document/Date	Comment	How/Where Comment is Addressed
	as discussed in meeting of 19 June	confirmed their advice on 26 July 2024 supersedes their advice on this subject issued on 10 July 2024.	
MD-LOT	Bellrock WFDA Scoping Opinion (2024), Paragraph 5.6.1	Scottish Ministers are broadly content with the offshore ornithology study area approach set out in Section 9.4.1 of Appendix 1.1: Bellrock WFDA Scoping Report (Volume IV), supported by NatureScot's representation.	No changes required. The defined study areas are considered appropriate and align with Scottish Ministers' and NatureScot's expectations. For further details, see **Section 10.5.1**.
MD-LOT	Bellrock WFDA Scoping Opinion (2024), Paragraph 5.6.2	Scottish Ministers are content with data sources listed in Section 9.4.2 and Table 9.3 of Appendix 1.1: Bellrock WFDA Scoping Report (Volume IV). NatureScot note the data covers March 2022 to February 2023; a second full year of DAS should be included before application to ensure a complete baseline and allow resolution of issues.	Two full years of DAS have been completed, and the two annual reports (and a comparison of the separate and combined years of density/abundance estimates) have been shared with NatureScot before the Bellrock WFDA consent applications were submitted. The full two years of DAS data have been used to inform the assessment. For further details, see **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV).**
MD-LOT	Bellrock WFDA Scoping Opinion (2024), Paragraph 5.6.3	Scottish Ministers are content with impacts scoped in (Section 9.6.1/Table 9.5 of Appendix 1.1: Bellrock WFDA Scoping Report (Volume IV) but agree with NatureScot that vessel movement disturbance, lighting effects (including on nocturnal species), and impacts from wet storage should be considered. Broadly agree with impacts scoped out in Section 9.6.2.	Vessel movement disturbance, lighting effects (including on nocturnal species) are included in Bellrock WFDA Offshore Ornithology **Section 10.8**. See response to NatureScot comments on 'wet storage' below. Lighting effects are considered as potential impact pathways in **Sections 10.8.1.3**, **10.8.2.8** and **10.8.3.3.** Vessel disturbance is included in **Sections 10.8.1.1**, **10.8.2.1** and **10.8.3.1.**
MD-LOT	Bellrock WFDA Scoping Opinion (2024), Paragraph 5.6.4	Ministers support the proposed assessment approach but require NatureScot's advice on guillemot/razorbill correction factors, apportioning, density estimates, collision risk modelling, Population viability analysis (PVA), and HPAI to be fully implemented in the Bellrock WFDA EIA Report.	NatureScot advice is implemented regarding guillemot/razorbill breeding population correction factors, presented in **Appendix 10.5: Offshore Ornithology Apportioning Technical Report (Volume IV)**. NatureScot advice is implemented regarding apportioning, presented in **Appendix 10.5: Offshore Ornithology Apportioning Technical Report (Volume IV)**. NatureScot advice is implemented regarding density estimates, presented in **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)**.

Consultee	Document/Date	Comment	How/Where Comment is Addressed
			NatureScot advice is implemented regarding CRM, presented in **Appendix 10.2: Collision Risk Modelling Technical Report (Volume IV)**. NatureScot advice is implemented regarding PVA, presented in **Appendix 10.4: Offshore Ornithology Population Viability Analysis Technical Report (Volume IV)**. NatureScot advice is implemented regarding HPAI, presented in **Section 10.6.4.3** (as well as in the **Bellrock WFDA Shadow HRA (Volume VI)**).
MD-LOT	Bellrock WFDA Scoping Opinion (2024), Paragraph 5.6.5	Ministers are content with mitigation/monitoring measures in Section 9.5.1 and Appendix 3 of Appendix 1.1: Bellrock WFDA Scoping Report (Volume IV) but agree with NatureScot that they are minimal for this early stage; full range of measures and guidance should be included in the Bellrock WFDA EIA Report.	Offshore ornithology mitigation measures and guidance are set out in **Section 10.7.3**. Management plans are outlined throughout **Section 10.8**. and the following relevant plans and outline plans are provided in **Volume V:** ▪ **Outline Environmental Management Plan (EMP)** ▪ **Marine Pollution Contingency Plan (MPCP);** ▪ **Outline Lighting and Marking Plan (LMP);** and ▪ **Outline Vessel Management and Navigational Safety Plan (VMNSP).** It is not considered appropriate to propose specific monitoring measures at this stage; these will be dependent on the final agreed outcomes of the EIA and HRA assessments, and also will need to ensure that any monitoring is complimentary to other projects coming forward in the region. The Applicant will continue to engage with MD-LOT, NatureScot and other relevant key stakeholders to identify and consider contributions to targeted and proportionate regional or strategic monitoring to better understand the environmental effects of offshore wind, taking account of known evidence gaps. The Applicant proposes any future monitoring would focus on key species associated with the Bellrock WFDA, and would be developed post consent. Any such measures will be agreed with key stakeholders and will be set out in a Project Environmental Monitoring Programme (PEMP) that will be submitted prior to commencement of development, and secured by condition of the s.36 Consent, The PEMP will be updated during the operational phase as required.

Consultee	Document/Date	Comment	How/Where Comment is Addressed
MD-LOT	Bellrock WFDA Scoping Opinion (2024), Paragraph 5.6.6	MD-LOT broadly support the cumulative impact assessment (CIA) approach (Section 9.6.3 of Appendix 1.1: Bellrock WFDA Scoping Report (Volume IV). If the Cumulative Effects Framework (CEF) is published during the project, it should be used. Natural England's cumulative and in-combination comments must also be addressed.	CEA is detailed in **Section 10.9**. At the time of writing, The Marine Directorate's CEF has yet to be published and endorsed for use in assessments by NatureScot. Therefore, for displacement and collision impacts, the cumulative mortalities for the other plans and projects were taken from the totals collated by the North East and East Ornithology Group (NEEOG) Interim CEF project, using the most recently available update to these totals (i.e. April 2025), as agreed in email from NatureScot on 10 February 2025.
MD-LOT	Bellrock WFDA Scoping Opinion (2024), Paragraph 5.6.7	MD-LOT agree with NatureScot that transboundary impacts are limited but recommend further engagement with NatureScot and MD-LOT before finalising the Bellrock WFDA EIA Report.	The Applicant has engaged in ongoing consultation with NatureScot and MD-LOT to inform the assessment process for ornithology. The transboundary assessment is presented in **Section 10.10**.
MD-LOT	Bellrock WFDA Scoping Opinion (2024), Paragraph 5.6.9	NatureScot do not recommend screening out breeding season sites/features until the full 2-year survey data is available; conclusions can be reviewed after second year report is available. The Applicant is also directed to the comment regarding seabird assemblages and should ensure that this is reflected in the Bellrock WFDA EIA Report.	The assessment reflects the result of the full 2-year DAS data. The findings of the **Bellrock WFDA HRA Screening Report (Volume VI)** are reviewed and revised in Section 2 of the **Bellrock WFDA RIAA: Part 3 (Volume VI)** on the basis of the full 2-year DAS data. The Applicant correctly assigned features as only being named components of the seabird assemblage feature within the **Bellrock WFDA HRA Screening Report (Volume VI)**, with the NatureScot comment on this point in their representation being clarified in the email from NatureScot on 4 October 2024. Within the **Bellrock WFDA RIAA: Part 3 (Volume VI)**, named components of the seabird assemblage feature are assessed at the individual species level in the same way as individual species that are qualifying features (see also **Section 10.8** and **10.9**, noting that the assessment of assemblage features is an HRA matter and therefore not directly relevant to the EIA).
MD-LOT	Bellrock WFDA Scoping Opinion (2024), Paragraph 5.6.10	MD-LOT advise that lighting effects and vessel disturbance should be considered as potential impact pathways for all phases of the development.	Lighting effects are considered as potential impact pathways in **Sections 10.8.1.3**, **10.8.2.8** and **10.8.3.3**. Vessel disturbance effects are considered in **Sections 10.8.1.1**, **10.8.2.1** and **10.8.3.1**.

Consultee	Document/Date	Comment	How/Where Comment is Addressed
MD-LOT	Bellrock WFDA Scoping Opinion (2024), Paragraph 5.6.12	Paragraph 5.6.12 of Scoping Opinion: MD-LOT do not expect two separate offshore ornithology assessments; NatureScot guidance should be followed, but differences between Natural England and NatureScot approaches (especially for English seabirds in in-combination assessments) should be acknowledged in the EIA and RIAA.	NatureScot guidance is followed at all stages of the assessment. The Applicant acknowledges that there are some differences in the approach advised by Natural England. It is considered unlikely that applying the Natural England guidance would result in a materially different conclusion to the assessment presented within this Chapter or within the **Bellrock WFDA RIAA: Part 3 (Volume VI)**. The adopted approaches are covered in this report **Section 10.4**, relevant assessment **Sections 10.8** and **10.9**, and in the supporting **Appendices 10.1** to **10.5 (Volume IV)**; and in the **Bellrock WFDA RIAA: Part 3 (Volume VI)**. The NatureScot guidance has been applied in this assessment having regard to the location of the Bellrock WFDA in the Scottish offshore region, and that the applications are to be determined by Scottish Ministers in consultation with NatureScot.
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	NatureScot recommend submission of the baseline characterisation DAS report during the pre-application stage rather than waiting until the application is submitted. This will enable any issues to be discussed and resolved in a timely manner.	Extensive consultation was undertaken with NatureScot on the 2-year DAS report (HiDef, 2024) (e.g. see response to Email from NatureScot to Applicant on 26 July 2024 above). This Chapter and the **Bellrock WFDA RIAA: Part 3 (Volume VI)** have been produced taking into account this NatureScot advice.
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	NatureScot expect the ornithological impact assessment to be based on our published guidance. Any deviation must be discussed and agreed in advance.	All aspects of the offshore ornithological impact assessment are based on the relevant NatureScot Guidance notes, with the exception of aspects of the assessments carried out based on NatureScot advice specifically given to the Applicant and which does not align fully with the guidance, as set out in this table.
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	Baseline Characterisation – As per Section 9.4 [of the Bellrock WFDA Scoping Report), this scoping exercise has been informed by available data from the project's year one aerial survey programme (i.e. for the period between March 2022 and February 2023 inclusive). Provided a full second year of DAS has been completed, and the data set covers two full breeding and non-breeding seasons, NatureScot anticipate that this will	The assessment is based on the full 2-year DAS data, as agreed with NatureScot. As detailed above, NatureScot reviewed the Bellrock 2-year DAS report, providing comments which have been addressed by the Applicant. For further details, see **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)** (Section 2.1) and **Table 2.1.**

Consultee	Document/Date	Comment	How/Where Comment is Addressed
		provide a sufficient baseline. If there are any gaps within the survey coverage (e.g. missed dates, surveys flown over multiple days) this will need to be discussed, and possible solutions provided.	
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	Further advice will be provided once the full baseline characterisation report is received. This should follow NatureScot's advice as per Guidance Note 2, (Guidance to support Offshore Wind Applications: Advice for Marine Ornithology Baseline Characterisation Surveys and Reporting) and NatureScot recommend this is submitted prior to application so that any issue can be discussed and resolved in advance. Selection of species for detailed assessment should be based on the two full years of survey data.	The assessment has been undertaken in accordance with NatureScot guidance and advice received throughout consultation and is based on the full 2-year DAS data. For further details, see **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV).**
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	From our review of the Year 1 DAS Annual Report (March 2022 to February 2023), NatureScot advise that it would be helpful to understand how comparable the species identification rates are to other developments, especially for auks and terns.	The Applicant's response to NatureScot by email of 9 September 2024: Arctic and common terns are historically known as challenging birds to identify through DAS due to the small differences in morphological distinctive features. Over the years, the overall experience of the HiDef ID team, and improvements in footage quality, means that the identification of these two species where possible is made with a relatively high degree of confidence. In the Bellrock survey area, no common terns were identified throughout the survey period, therefore all the "arctic/common tern" birds were apportioned to Arctic terns when calculating the apportioned density and population estimates. The summer peaks of [auk] non-identification relate primarily to difficulties separating razorbill and guillemot and reflect the large number of birds present at that time. These are especially hard to distinguish when birds are in moult and accompanied by juveniles. Razorbills and guillemots are known to lay eggs between mid/late-April and late May, with incubation periods lasting approximately 34 days (Forrester et al. 2007). Once chicks have hatched, parents travel intensively to feed the chicks up until they reach ~3 weeks old, time when the flightless chicks leave the colony accompanied by the male parent. Therefore, the high numbers of

Consultee	Document/Date	Comment	How/Where Comment is Addressed
			auks at-sea in July are to be expected. This is further confirmed when looking at the number of adult/young pairs recorded during the survey period. A total of 227 and 23 adult/young pairs of guillemot and razorbill were recorded respectively in July 2022 and three adults/young pairs of guillemot were recorded in August 2022. Dispersal rates in colonies connected to the development is not information that is generally available, but it might be available for intensively monitored colonies such as Isle of May or Fair Isle. The number of unidentified auks (242) versus the total number of identified auks (1,948) in July 2022 provides an identification rate of 87.7%. This figure falls slightly below HiDef's ID rate target of 90% but it is not significantly lower. The overall avian ID rate for the 24 months of survey was 94.26% but there were three months with ID rates of between 85% and 90% (including July 2022). HiDef data from other offshore wind sites off Northeast Scotland show comparable identification rates although July 2022 is a little lower than those reviewed (all sites recorded an identification rate between 90% and approximately 95%). Various factors may contribute to a lower ID rate, particularly weather conditions, although it is not believed to have been a significant factor here. HiDef would like to see very high ID rates and strive to update hardware, software, training, and techniques to achieve that. It is unusual but not unknown for HiDef to see large auk ID rates just below 90% but is increasingly rare. Unidentified auks recorded in July 2022, and other surveys will be apportioned appropriately for each auk species, and their respective density and population estimates, as is the case for all auks where there is not an ID rate of 100%. The Applicant therefore does not consider that the lower ID rate in July 2022 will detrimentally affect the overall data provided for the purposes of assessing auk species for the EIA.

<table>
<tr><th>Consultee</th><th>Document/Date</th><th>Comment</th><th>How/Where Comment is Addressed</th></tr>
<tr><td>NatureScot</td><td>Representation on the Bellrock WFDA Scoping Report (2024)</td><td>Over the past couple of years there have been large seabird mortality events, notably the auk wreck along the East Coast of Scotland in 2021 and the ongoing outbreak of HPAI. When comparing the Year 1 DAS findings to the Year 2 findings, any local or regional mortality events information should be considered when interpreting the results.</td><td>Local and regional mortality events information is considered throughout species assessments in Section 10.8 and Section 10.9. Specific consideration of the implications of HPAI in relation to the assessment conclusions is provided in Section 10.6.4.3 and in the Bellrock WFDA RIAA: Part 3 (Volume VI).</td></tr>
<tr><td>NatureScot</td><td>Representation on the Bellrock WFDA Scoping Report (2024)</td><td>The Year 1 DAS report notes there were 274 gannets observed throughout the data collection period and that there were 100 dead birds recorded. It is not clear however if the 100 dead birds observed are part of the 274 gannets seen overall or were additional?</td><td>The Applicant’s response to NatureScot (email of 9 September 2024): The additional dead birds were recorded amongst the unidentified birds. Please see the table below for the total number of dead birds found during the survey period.

Number of dead birds recorded in the Bellrock survey area between March 2022 and February 2024
<table>
<tr><th>Species</th><th>Total</th></tr>
<tr><td>Fulmar</td><td>2</td></tr>
<tr><td>Gannet</td><td>101</td></tr>
<tr><td>Guillemot</td><td>2</td></tr>
<tr><td>Kittiwake</td><td>2</td></tr>
<tr><td>Lesser black-backed gull</td><td>1</td></tr>
<tr><td colspan="2">Unidentified species</td></tr>
<tr><td>Auk species</td><td>2</td></tr>
<tr><td>Fulmar/gull species</td><td>1</td></tr>
<tr><td>Gull species</td><td>1</td></tr>
<tr><td>Large auk species</td><td>53</td></tr>
<tr><td>GRAND TOTAL</td><td>165</td></tr>
</table>
The high number of dead gannets is likely due to the HPAI, which hit most Scottish colonies during the breeding season of 2022 (Falchieri et al. 2022; Tremlett et al. 2024a, b).</td></tr>
</table>

Consultee	Document/Date	Comment	How/Where Comment is Addressed
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	Two study areas have been defined, as described in Section 9.4.1. We are content with the study areas proposed, which consist of: ▪ Offshore Regional Study Area – defined by the area within which breeding and non-breeding seabirds could be impacted by the Bellrock WFDA (as described in paragraphs 733 and 734). ▪ Offshore Aerial Survey Area – defined by the survey area covered by the baseline Digital Aerial Surveys (DAS), which is the WFDA plus a 4 km buffer.	The applicant notes that NatureScot are content with the study areas proposed.
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	The scope of the surveys and survey design are acceptable. Monthly DAS were flown from March 2022 until February 2024 covering the development area and a 4 km buffer – and previously received the draft Year 1 Annual Report March 2022 to February 2023. A survey was undertaken each month, with transects 2.5 km apart and 12.5% coverage analysed. Flying height was 550 m and GSD was 2 cm. Identification rates averaged 92%, with unidentified birds apportioned to species level and availability bias was applied for auks. We are content with this approach. Ideally for a commercial scale development such as the Bellrock project, NatureScot would expect a 6 km buffer to be flown. In this instance we accept 4km.	The Applicant notes that NatureScot are content with the approach used for the 2-year DAS. It is also noted that, as outlined above, the Scottish Ministers are broadly content with the offshore ornithology study area approach set out in Section 9.4.1 of **Appendix 1.1: Bellrock WFDA Scoping Report (Volume IV).**
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	Disturbance and displacement pathways should include vessel movements between the WFDA and the ports being used in all phases of the project. Vessel movements have the potential to impact various species, including those sensitive to disturbance such as divers and sea ducks. This will depend on the ports used, routes taken and timing. This aspect requires further discussion during pre-application so agreement can be reached on assessment requirements.	Vessel disturbance is included in **Sections 10.8.1.1**, **10.8.2.1** and **10.8.3.1**.

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NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	With respect to nocturnal species, potential impacts from lighting should be considered. Species such as European storm petrel, Leach's storm-petrel and Manx shearwater may be attracted to and/or disorientated by artificial light sources. As well as turbine lighting, this should also include lighting on servicing or construction vessels, especially if construction will be a 24/7 operation. Such effects could influence assessment of collision and/or displacement. NatureScot recommend considering findings from the Marine Directorate commissioned review to inform the assessment of the risk of collision and displacement in petrels and shearwaters from offshore wind developments in Scotland.	Lighting effects are considered as potential impact pathways in **Sections 10.8.1.3**, **10.8.2.8** and **10.8.3.3**.
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	''Wet storage" could also be a significant impact pathway for ornithological receptors depending on the nature and location of activities associated with the construction assembly and maintenance of floating turbines. Agreement will be needed as to how this aspect is dealt with and assessed.	The temporary mooring of FSSs and/or FOUs at dedicated locations (known as 'wet storage') for the Bellrock Project will be considered through separate consenting process(es) as required. The Applicant is not seeking consent for wet storage within this application, and it has not been included within the scope of this EIAR. Any proposed projects in the public domain for wet storage facilities on the east coast of Scotland have been considered within the cumulative assessment along with other projects and plans (**Appendix 5.3: Cumulative Effect Assessment Long List of Projects, (Volume IV)**).
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	Approach to Assessment – Seasonal definitions are in accordance with NatureScot's Guidance Note 9. Estimates of breeding seabird population sizes, will be obtained from the Seabird Monitoring Programme (SMP) database and should use Seabirds Count data. Non-breeding seabird population sizes will be taken from Furness (2015) - this approach follows our guidance.	Estimates of breeding seabird population sizes were obtained from the SMP database and use Seabirds Count data for the breeding season apportioning to breeding colony populations. Non-breeding seabird population sizes are taken from Furness (2015) for purposes of the non-breeding season apportioning to breeding colony populations. As detailed below, for the purpose of assessing impacts against population sizes (including within PVAs) the most up-to-date population data from the SMP are used, in accordance with the NatureScot advice. In a very small number of instances the most up-to-date population size estimates have been derived from sources other than the SMP, where these sources are credible reports and the data are not yet available on the SMP. This is fully

Consultee	Document/Date	Comment	How/Where Comment is Addressed
			referenced within the application documents for the Bellrock WFDA. For further details, see: ▪ **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV);** and ▪ **Section 10.6.1.4**.
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	Approach to Assessment – For guillemot and razorbill, the population size estimates in the SMP are presented as the number of individuals counted at the colony, and therefore, correction factors do need to be applied to the counts. The correction factors have recently been updated and can be found in the new Seabirds Count book. For guillemot the correction factor is now 1.49 and for razorbill it is 1.34.	The correction factor of 1.34 has been applied to razorbill individual count data in the SMP database. For further details, see: ▪ **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV);** and ▪ **Appendix 10.5: Offshore Ornithology Apportioning Technical Report (Volume IV).** The correction factor of 1.49 has been applied to guillemot individual count data in the SMP database when calculating the apportioned breeding reference population (which is also the same reference population used for the post-breeding dispersal season). For further details, see: ▪ **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV);** and ▪ **Section 10.6.1.4** and **Table 10.16**.
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	Foraging ranges are as per our Guidance Note 3.	Foraging ranges are adopted in line with Guidance Note 3. For further details, see: ▪ **Appendix 10.5: Offshore Ornithology Apportioning Technical Report (Volume IV)**; ▪ **Section 10.6.1.4**; and ▪ **Table 10.15**.

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NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	With respect to apportioning, this will be done through the CEF in the future. This will incorporate both the 2018 Butler/Marine Directorate commissioned apportioning tool and NatureScot's theoretical approach as appropriate. The intention is that the CEF will use Seabirds Count data. The developers of the framework, the United Kingdom Centre for Ecology and Hydrology, are working with Marine Directorate regarding publication of the CEF, but NatureScot have no details on timescale at present	Apportioning of species to breeding colony populations during the breeding season has been undertaken using the 'theoretical approach' described in NatureScot's interim guidance (NatureScot, 2018). For some species the Marine Scotland (MS) apportioning tool (Butler et al. 2020) can also be used to provide apportioning estimates to breeding colonies, but this tool is not currently (at the time of writing) available for use (and also relies on Seabird 2000 (1998 - 2002) colony count data, which are out-of-date and no longer suitable for purposes of the breeding season apportioning).In their email of 4 October 2024, NatureScot confirmed that they consider the Applicant's approach to the breeding season apportionment, as set out in Appendix 6 of **Appendix 1.1: Bellrock WFDA Scoping Report (Volume IV)** (i.e. using the NatureScot (2018) 'theoretical approach'), to be appropriate. For further details, see **Appendix 10.5: Offshore Ornithology Apportioning Technical Report (Volume IV).**
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	Approach to Assessment – NatureScot have reviewed [Bellrock WFDA Scoping Report] Appendix 6 - Apportioning Breeding Season Impacts to SPA Seabird Populations. The breeding season apportionment detailed in Appendix 6 has been based on the four most abundant species in the first year of survey with theoretical connectivity based on foraging ranges. In relation to guillemot, although the assessment outlined follows NatureScot's guidance, due to the numbers present in the first year of the DAS NatureScot request a basic assessment of potential impacts is undertaken for guillemot in the breeding season using the regional population (such as Biologically defined minimum population scales (BDMPS)). This list of species should be reviewed when the results from the full two years of survey have been analysed.	The species subject to breeding season apportionment following two years of DAS data collection are detailed in **Appendix 10.5: Offshore Ornithology Apportioning Technical Report (Volume IV)**. As detailed below, in relation to guillemot, further clarifications were provided in an email from NatureScot on 8 October 2024, with agreement that there would not be an assessment of guillemot in the **Bellrock WFDA RIAA: Part 3 (Volume VI)** due to the lack of connectivity with SPA colonies during the breeding and non-breeding seasons but that the assessment for the regional populations should be based upon the maximum foraging range from Woodward et al. (2019) and use three seasonal periods (i.e. breeding, post-breeding and non-breeding). For further details, see: ▪ **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV);** ▪ **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV);** ▪ **Section 10.6.1.4;** and ▪ **Table 10.16**.

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NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	The narrative provided in paragraphs 791 to 795 in Section 9.7.1 of the Bellrock WFDA Scoping Report (2024) which summarises recent use of model versus design-based estimates is helpful. NatureScot's guidance on density estimation and the preferred use of MRSea density modelling approaches has not changed, however NatureScot acknowledge that issues with number of data points and model fit can sometimes preclude use of this method	As agreed in an email from NatureScot on 19 July 2024 (see above), NatureScot are content to accept the use of design-based estimates. Density estimates for guillemot were generated by both approaches, on the basis that guillemot was the most abundant and frequently occurring species in the Bellrock DAS and, therefore, the most suitable species for the application of model-based methods. Following a comparison of the design-based and model-based estimates of guillemot density presented in **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)**, no benefit to the use of the model-based densities was identified and hence the assessment for guillemot relies on the design-based estimates. The design-based and model-based (MRSea) density estimates for guillemot have been presented in **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)**. Subsequent assessment (i.e. as set out in **Section 10.8.2.3.2.2**) has used design-based estimates only, noting that NatureScot. were informed that the model-based estimates provided no benefits over the design-based estimates (as the results of the model-based estimates were very similar to the design-based estimates, with no directional bias in the small differences in the outputs derived from the two approaches, whilst there was no greater precision in the model-based estimates) and raised no concerns on this point (in emails of 7 January 2025 from the Applicant to NatureScot and of 9 January 2025 from NatureScot to the Applicant).
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	The Applicant proposes to use model-based approaches for the impact assessment for the most abundant species (subject to model performance). Design-based density estimates will also be generated for these species as well those species for which sufficient sample size allows. This approach is acceptable on the basis that information is provided in the Bellrock WFDA EIA Report for key species to enable comparison between model-based and design-based estimates for all birds (sitting + flying), sitting birds and as well as flying birds that are within the WFDA plus 4 km buffer.	See response above.

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NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	The data sources outlined in Section 9.7.6 of the Bellrock WFDA Scoping Report (2024) follow our NatureScot Guidance Note 7. However, as noted during the Scoping workshop, this guidance note is being updated and should be available shortly. Option 3 is no longer required.	The most recent guidance available when the assessment was being prepared has been used. As detailed above, advice from NatureScot on CRM parameters were provided in emails of 12 July 2024 and 19 July 2024, with subsequent agreement in an email from NatureScot on 10 December 2024 that the CRMs should use the avoidance rates as presented in the '*Joint advice note from the Statutory Nature Conservation Bodies (SNCBs) regarding bird collision risk modelling for offshore wind developments'* which was published in late 2024. The 2025 update to NatureScot Guidance Note 7 (NatureScot, 2025b) was not available at the time the CRMs had to be undertaken. For further details, see **Table 10.1**.
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	Approach to Assessment – With respect to use of a macro-avoidance rate for gannet highlighted in the Bellrock WFDA Scoping Report paragraph 810, as discussed during the scoping workshop, NatureScot only accept its use for assessment of non-breeding season impacts.	Macro-avoidance has been applied to gannet density estimates used for the CRM for the autumn and spring passage periods only, in accordance with NatureScot advice. For further details, see **Appendix 10.2: Collision Risk Modelling Technical Report (Volume IV).**
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	The figures presented in Table 1 within Appendix 1 of NatureScot's Guidance Note 7 should be used for the deterministic assessment and the figures presented in Table 2 within Appendix 1 of Guidance Note 7 should be used for the stochastic assessment. The figures presented in Table 9.9 can be used for both deterministic and stochastic assessments. Some of the parameter values identified [in Table 2 within Appendix 1] will no longer need to be consulted on as we will present these in our updated guidance note, however, some parameter values will still need to be discussed and agreed.	As detailed above, advice from NatureScot on CRM parameters were provided in emails of 12 July 2024 and 19 July 2024, with subsequent agreement in an email from NatureScot on 10 December 2024 that the CRMs should use the avoidance rates as presented in the '*Joint advice note from the Statutory Nature Conservation Bodies (SNCBs) regarding bird collision risk modelling for offshore wind developments'* which was published in late 2024. The 2025 update to NatureScot Guidance Note 7 (NatureScot, 2025b) was not available at the time the CRMs had to be undertaken (noting that any differences in outputs that arose from application of the updated guidance would be extremely small and of a trivial nature, with the updated guidance associated with no changes to the avoidance rates as used in this assessment). For further details, see: ▪ **Appendix 10.2: Collision Risk Modelling Technical Report (Volume IV);** and ▪ **Section 10.8.2.5**.

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NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	The displacement and mortality rates outlined in Table 9.8 (Section 9.7.5) of the Bellrock WFDA Scoping Report (2024) for use in the matrix-based displacement assessment are in line with NatureScot's guidance.	NatureScot guidance, including displacement and mortality rates, has been used in the assessment. For further details, see: ▪ **Appendix 10.3: Offshore Ornithology Displacement Assessment Report (Volume IV);** and ▪ **Section 10.8.2.3**.
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	Approach to Assessment – Paragraph 813, Section 9.7.7 of the Bellrock WFDA Scoping Report (2024) notes that the use of the 0.02 percentage point change in adult mortality threshold [in PVA] may not be appropriate for some species. This is contrary to NatureScot's current guidance, and NatureScot's advice that that this threshold is used for all species.	The NatureScot advised threshold of 0.02 percentage point change has been used for all species when considering the requirement for PVA. For further details, see **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV).**
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	In line with paragraph 815, Section 9.7.7 of the Bellrock WFDA Scoping Report (2024), NatureScot agree the most up to date population data from the SMP database should be used to provide baseline colony population sizes in the PVA. Agreement on use of species demographic data will be required once the JNCC review of Horswill and Robinson (2015) is complete – NatureScot expect this to be published shortly. Inclusion of any site-specific data should be discussed and agreed in advance.	The most recent counts from the SMP have been used for colony population sizes within the PVAs, with a very small number of exceptions. The exceptions are instances in which the most recent data are taken from credible reports, with these data not yet available on the SMP at the time the PVAs were undertaken, and are considered to provide reliable, contemporaneous, estimates for these SPA populations. Where this is the case, this is detailed in Table 2.1 of **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)**. As detailed below and following subsequent advice from NatureScot in their email of 4 October 2024, species demographic data used in the PVA were derived from Horswill and Robinson (2015). Any updates to these data (including the JNCC review) were not available at the time the PVAs were undertaken. For further details, see **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)**.

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NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	Approach to Assessment – Please be aware that NatureScot currently advise that collision impacts and distributional response impacts should be additive for kittiwake and gannet [in PVA]. This reflects the best publicly available evidence for considering these species which are susceptible to both impacts. With regards to the work undertaken by Natural England around macro-avoidance for gannet, NatureScot are not currently adopting the full recommendations of this work. NatureScot do however accept the output for gannet during the non-breeding season (Pavat et al, 2023).	The assessment has presented the additive effects of collision and displacement for kittiwake and gannet, in accordance with NatureScot advice and guidance. See response above confirming that macro-avoidance for gannet has been applied only in the spring and autumn passage (i.e. non-breeding) periods. For further details, see: ▪ **Section 10.8.2.6**; ▪ **Bellrock WFDA RIAA: Part 3 (Volume VI)**; and ▪ **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV).**
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	Approach to Assessment – There is a need for ongoing engagement in relation to the impacts of HPAI and how to incorporate these impacts within assessments. Work is continuing within NatureScot to provide further information, which NatureScot will do when we can. In the meantime, NatureScot expect the impact of HPAI on colonies to be considered qualitatively especially when reviewing PVA outputs. As the DAS survey work straddles the HPAI outbreak years, it will be important for assessment purposes to consider the current status of seabird populations at SPA colonies. Surveys were undertaken in 2023 at various key seabird colonies affected by HPAI, coordinated by Royal Society for the Protection of Birds (RSPB), and some will be repeated in 2024. Recent data for key species at some sites can already be found on the SMP database. RSPB have just published a report on HPAI effects which will provide helpful context: 'UK seabird colony counts in 2023 following the 2021-22 outbreak of HPAI Research Report 76. RSPB Conservation Science.'	A review of the effects of HPAI in relation to the assessment is presented in **Section 10.6.4.3** and in Section 4.2.1 of the **Bellrock WFDA RIAA: Part 3 (Volume VI)**.
NatureScot	Representation on the Bellrock WFDA	Section 9.6.3 of the Bellrock WFDA Scoping Report (2024) discusses potential CEA, whereby the cumulative	The cumulative assessment has been undertaken in accordance with NatureScot advice and is presented in **Section 10.9**.

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	Scoping Report (2024)	assessment will be considered in two stages covering a CEA of the whole Bellrock project (e.g. Bellrock WFDA and Bellrock Offshore Transmission Development Area (OfTDA)) and a CEA of the whole project also alongside other plans or projects. We are content with this approach. As per paragraph 786 of the Bellrock WFDA Scoping Report (2024), we agree that if the CEF is published within the project timeframe then it should be used to undertake the cumulative assessment. If it is not published, NatureScot are currently preparing guidance on aspects to be considered and presented in the EIA and RIAA.	At the time of writing the CEF has not yet been published. For displacement and collision impacts, the cumulative mortalities for the other plans and projects were taken from the totals collated by the NEEOG Interim CEF project, using the most recently available update to these totals (i.e. April 2025), as agreed with in an email from NatureScot on 7 February 2025. For further details, see: ▪ **Bellrock WFDA RIAA: Part 3 (Volume VI);** and ▪ **Appendix 10.4 Offshore Ornithology Population Viability Technical Report**.
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	Cumulative Assessment – In addition, NatureScot have advised Marine Directorate that the Berwick Bank application will have an adverse effect on site integrity (AEoSI) either alone or in-combination for multiple seabird species within the UK European Site Network, some of which overlap with the species and sites assessed in other applications. Consequently, as the outcome of the Berwick Bank application is unknown at present, further advice should be sought from Marine Directorate on which sites and qualifying feature will need to be considered for the in-combination assessment.	COMMENT/ADVICE SUPERSEDED See later advice and response re: inclusion of Berwick Bank Wind Farm, noting that this project has now been consented and the assessment has been undertaken on that basis.
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	We welcome the identification of “embedded mitigation measures” described in Section 9.5.1 of the Bellrock WFDA Scoping Report (2024) and summarised in Appendix 3 - Mitigation Register. The examples provided are appropriate, although the list of mitigation measures in this Bellrock WFDA EIA Scoping Report is minimal given the early stage of project development.	Confirmation of proposed embedded mitigation is provided in **Section 10.7.3**.
NatureScot	Representation on the Bellrock WFDA	Mitigation and Monitoring – No specific monitoring for offshore ornithology is mentioned in the Bellrock WFDA Scoping Report. Further information on proposed	It is not appropriate to propose specific monitoring measures at this stage; these will be dependent on the final agreed outcomes of the EIA and HRA assessments, and also will need to ensure that any monitoring is

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	Scoping Report (2024)	ornithological monitoring should be discussed in the Bellrock WFDA EIA Report.	complimentary to other projects coming forward in the region. Instead the Applicant will continue to engage with MD-LOT, NatureScot and other relevant key stakeholders to identify and contribute to targeted and proportionate regional or strategic monitoring to better understand the environmental effects of offshore wind, taking account of known evidence gaps. This may involve engaging and contributing to ongoing strategic initiatives such as ScotMER. The Applicant proposes any future monitoring would focus on key species, and would be developed post consent. These measures will be agreed with key stakeholders and will be set out in a Project Environmental Monitoring Programme.
NatureScot	Representation on the Bellrock WFDA Scoping Report (2024)	Potential transboundary impacts are briefly described Section 9.6.4 of the Bellrock WFDA Scoping Report (2024). NatureScot are content with what is proposed but given the limited information presented, NatureScot cannot provide further advice at this stage.	Transboundary impacts are addressed in **Section 10.10**.
Natural England	Representation on the Bellrock WFDA Scoping Report (2024)	For the Bellrock Offshore Wind Farm, Natural England advise that as a minimum, gannet from Flamborough and Filey Coast Special Protection Area (SPA) and Puffin from the Farne Islands SPA are scoped into the Environmental Statement and HRA. This is due to the windfarm being within the maximum foraging range of these colonies. We do not expect to provide further comments or advice on other receptors unless the project changes substantially.	Effects on features of the Flamborough and Filey Coast SPA and Farne Islands SPA (as well as Coquet Island SPA) are addressed in the **Bellrock WFDA RIAA: Part 3 (Volume VI)**.
NatureScot	Email from NatureScot to the Applicant on 4 October 2024 – Response to Actions and Agreements table received by NatureScot by email 9 September 2024	Regarding the apportioning appendix submitted as part of the Bellrock WFDA scoping report, NatureScot consider the approach to breeding season apportionment, as set out in the Bellrock WFDA Scoping Report – Appendix 6 to be appropriate. Appendix 6 follows the NatureScot guidance included within 'Interim Guidance on apportioning impacts from marine renewable developments to breeding seabird populations in SPAs' (2018). NatureScot noted the conclusions that any impacts arising from the Bellrock	Noted. As detailed above, the apportioning undertaken for the breeding season colony populations uses the NatureScot (2018) interim guidance/ 'theoretical approach', and is presented in **Appendix 10.5: Offshore Ornithology Apportioning Technical Report (Volume IV)**.

Consultee	Document/Date	Comment	How/Where Comment is Addressed
		development are likely to affect birds from a small number of sites. Please also see pg. 18-19 of NatureScot's Scoping advice which addresses the Scoping question presented regarding data sources suggested for apportioning.	
NatureScot	Email from NatureScot to the Applicant on 4 October 2024 – Response to Actions and Agreements table received by NatureScot by email 9 September 2024	Regarding species demographic data to use in assessment, NatureScot issued advice on the Broadshore Scoping Report on 11 March 2024 and the Bellrock WFDA Scoping Report on 13 May 2024. In the time between issuing the Broadshore and Bellrock advice NatureScot were made aware that an updated JNCC report on demographic rates may have been available within Bellrocks assessment timeline. NatureScot confirm that this is not going to be the case, as the report will not be published until late 2024, and therefore for Bellrock, Horswill and Robinson (2015) should be used for deriving demographic rates.	Noted. As detailed above, demographic rates from Horswill and Robinson (2015) have been used within the assessment, as advised by NatureScot. For further details, see **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV).**
NatureScot	Email from NatureScot to the Applicant on 4 October 2024 – Response to Actions and Agreements table received by NatureScot by email 9 September 2024	Regarding NatureScot's previous claim that Bellrock has erroneously assigned features as only being named components of the seabird assemblage feature for some SPAs (in Table 7.5 of the HRA Screening), NatureScot note the confusion around their advice regarding assemblage features for SPAs. To clarify further, any named qualifying species of an assemblage feature in an SPA is protected in their own right. The SPA conservation objectives are set for individual species rather than the assemblage and therefore the features should be assessed and any impacts concluded at the individual species level. Provided this is undertaken no further action is required.	Noted. Assemblage species have been assessed within the **Bellrock WFDA RIAA: Part 3 (Volume VI)** as advised by NatureScot.
NatureScot	Email from NatureScot to the Applicant on 4 October 2024 –	Regarding whether SeabORD should be used to inform assessments, NatureScot consider SeabORD to be a more biologically representative approach for estimating the impacts of distributional responses than the matrix	COMMENT/ADVICE SUPERSEDED See later advice and response re: use of SeabORD.

Consultee	Document/Date	Comment	How/Where Comment is Addressed
	Response to Actions and Agreements table received by NatureScot by email 9 September 2024	approach. However, some other developments have been able to progress their application using the matrix approach due to project specific issues around the availability of SeabORD and project timescales. NatureScot advised that Bellrock contact Marine Directorate regarding the currently available version of SeabORD. Should Bellrock be unable to access SeabORD then NatureScot can accept the matrix approach. Bellrock to confirm which approach will be used and why.	
NatureScot	Email from NatureScot to the Applicant on 4 October 2024 – Response to Actions and Agreements table received by NatureScot by email 9 September 2024	Regarding confirmation whether there is a need for model-based density estimates for species screened in for collisions, NatureScot consider this point to be closed following advice issued on 19 July 2024: "Following discussions during the call on 19 June [2024] (as recorded in meeting minute items 1 and 2) and further review of the findings reported in the Bellrock 2-year DAS report, we are content to accept the use of design-based estimates and advise that in this case we do not require model-based density estimates."	Noted. Design-based density estimates have been used for CRMs, as agreed with NatureScot. For further details, see: ▪ **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline (Volume IV);** ▪ **Appendix 10.2: Offshore Ornithology Collision Risk Modelling Technical Report (Volume IV);** and ▪ **Section 10.8.2.5.**
NatureScot	Email from NatureScot to the Applicant on 8 October 2024	Regarding assessment for guillemot, NatureScot guidance for guillemot connectivity has been applied correctly, whereby a foraging range of 95.2 km has been applied (during both the breeding and non-breeding season) which in this instance means Bellrock falls outside this range. However, NatureScot reserve the right to amend this guidance once project specific information is available, as has been reflected in scoping/screening advice. Noting, that while the number of guillemots seen during most months in the first year of DAS do not cause concern, there is evidence of a drastic increase in July 2022.	As detailed above, the assessment follows this advice provided by NatureScot for guillemot. Thus, the seasonal periods advised by NatureScot specifically to be used for guillemot in the Bellrock WFDA EIA: Breeding Season (Apr – Jun), Post-Breeding Dispersal (Jul – Sep), and Migration Free Winter or Non-Breeding Period (Oct – Mar) are applied. For guillemot, the NatureScot (2020) guidance assumes a single non-breeding season (as does Furness, 2015), so differing from this advice from NatureScot on the guillemot seasonal periods, which is specific to the Bellrock WFDA. Within **Appendix 10.1 Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)**, the data on guillemot densities and abundance are presented according to both the 'generic' guidance and project-specific advice on seasonal periods (in accordance with this advice from NatureScot and the NatureScot guidance), although the assessment is

Consultee	Document/Date	Comment	How/Where Comment is Addressed
		Therefore, NatureScot advised as per 13 March 2024 that ''due to the numbers [of guillemot] present in the first year of DAS we request a basic assessment of potential impacts is undertaken for guillemot in the breeding season using the regional population (such as BDMPS).'' NatureScot understand this increase to represent post-breeding movements - a time at which guillemot adult/chick pairs are at a higher risk from disturbance. Similar post breeding peaks have also been seen in other developments, noting that this is variable in nature with little understanding yet on drivers for this. And that evidence is emerging which suggests that auks react more to disturbance further offshore. In reviewing both DAS years, NatureScot note that guillemot are almost entirely absent from the Bellrock survey area in the second year. While this could be attributable to variability in post breeding movement, the second year also coincided with the HPAI outbreak affecting both guillemot and razorbills. All of which means NatureScot consider a more nuanced approach is required with an assessment of guillemot required at a regional level during the post-breeding period. This assessment should be provided within the EIA and address the following points: The July 2022 peak represents post-breeding movement to post-breeding moult areas, such as those identified in tagging studies (Buckingham et al. 2022). This study highlights two areas that were commonly used by multiple colonies of guillemots during this period: off the North coast and off the West coast of Scotland. In each year, the North coast area was populated by all of the Northern (Fair Isle and Foula) and Eastern (East Caithness, Whinnyfold and the Isle of May) colonies tracked. As such, NatureScot consider that the regional populations should be based on maximum foraging range from Woodward et al (2019) e.g. 338 km, for July to	undertaken only in relation to the seasonal periods as defined in this advice from NatureScot. The regional reference population for guillemot has been defined using the maximum foraging range from Woodward et al. 2019) in accordance with this advice from NatureScot. For further details, see: ▪ **Section 10.6.1.4**; ▪ **Table 10.16**; and ▪ **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV).**

Consultee	Document/Date	Comment	How/Where Comment is Addressed
		September. This would result in three seasons for the guillemot assessment: breeding, post-breeding and non-breeding season. NatureScot accept that there will not be any assessment for guillemot within the RIAA. While they note that the post-breeding period has connectivity to SPAs, at this point in time there is insufficient evidence to apportion to SPA colonies. Therefore, NatureScot consider this should be addressed through the EIA with commentary provided. If the predicted impact to guillemot is **significant** in EIA terms, NatureScot would expect full consideration of the mitigation hierarchy including offsetting. Specific consideration of vessel management during key dispersal periods (July to September) will also be required.	
	Email from NatureScot to the Applicant on 24 October 2024	In general, NatureScot preference is for SeabORD to be used as they consider it to be a more biologically representative approach for estimating the impacts of distributional responses than the matrix approach. Advice regarding when to use SeabORD and the matrix approach is included in NatureScot Guidance Note 8. However, as mentioned in advice issued on 4 October 2024, NatureScot are aware that in some instances other developments have had issues accessing SeabORD. If Bellrock are unable to access SeabORD then we can accept the matrix approach. Bellrock confirmed on 12 November 2024 that the project will use SeabORD.	COMMENT/ADVICE SUPERSEDED See later advice and response re: use of SeabORD.
NatureScot	Minutes from Bellrock WFDA Collision Risk Modelling Workshop held on 29 October 2024	Meeting Minutes - NatureScot provided feedback on terminology alignment, supported the use of updated SNCB avoidance rates for collision risk modelling, and advised that any deviations from guidance be clearly stated in the Bellrock WFDA EIA Report. A 22 m air gap proposed by the Applicant was noted by NatureScot as consistent with expectations.	CRM has been undertaken using the new avoidance rates included within the SNCB joint guidance note rather than the avoidance rates agreed with NatureScot on 19 July 2024. For further details, see: ▪ **Appendix 10.2: Offshore Ornithology Collision Risk Modelling Technical Report (Volume IV);** and ▪ **Section 10.8.2.5**.

Consultee	Document/Date	Comment	How/Where Comment is Addressed
NatureScot	Email from NatureScot to the Applicant on 9 January 2025	Regarding whether the MRSea modelling should be re-run for purposes of providing the information to NatureScot on significant environmental covariates identified following the different definition of seasonal periods, NatureScot agree that re-running the modelling is unlikely to change the density estimates for guillemot. As such, NatureScot are content with use of the MRSea modelling outputs and values which have already been calculated. Narrative on this should be included within the relevant part of the forthcoming Bellrock application, covering the explanation and detail included in an email from the Applicant to NatureScot of 7 January 2025.	Modelling in MRSea was conducted separately for surveys within the guillemot breeding and non-breeding periods, as defined in the NatureScot (2020) guidance, which differed from the seasonal periods that were subsequently advised by NatureScot to be used for guillemot in the current assessment (see above). However, the seasonal period definition was considered immaterial to the estimation of densities because survey identity is included as a factor in the analysis, meaning that 'intercept' values are estimated for each survey to provide separate density estimates for each survey (irrespective of the seasonal period definition used). On this basis, NatureScot agreed with the decision not to re-run the modelling according to the amended seasonal periods subsequently advised for guillemot). The narrative on this is detailed in Section 2.2.3 of **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV).** The email from the Applicant to NatureScot of 7 January 2025 also stated that "*the comparisons that have been undertaken between the model-based and design-based density estimates derived from the Bellrock DAS data for guillemot suggest no benefits to using the model-based estimates in place of the design-based estimates (and, if anything, suggest benefits to the design-based estimates – e.g. in terms of slightly lower variability about the mean estimates).*" For further details, see: ▪ **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV);** and ▪ **Section 10.8.2.3.2.2**.
	Email from NatureScot to the Applicant on 7 February 2025	NatureScot are content that the North East and East Ornithology Group (NEEOG) led cumulative work packages are used by Bellrock to inform cumulative/in-combination assessments, should the Scottish Government led CEF tool not be available. NatureScot expect these packages, if used, to be included in the Bellrock WFDA EIA Report as appendices. NatureScot confirm that it is still their current advice position to run cumulative and in-combination both with Berwick Bank included and excluded.	The cumulative and in-combination assessments have been undertaken in accordance with NatureScot advice and are presented in **Section 10.9** and the **Bellrock WFDA RIAA: Part 3 (Volume VI)**, respectively. At the time of writing, the Marine Directorate CEF tool is not yet available and, therefore, the assessments for cumulative and in-combination displacement and collision impacts rely on the mortalities for the other plans and projects as determined from the totals collated by the NEEOG Interim CEF project, using the most recently available update to these totals (i.e. April 2025). Details of these totals and their derivation are provided in Annex

Consultee	Document/Date	Comment	How/Where Comment is Addressed
		Further to the above, and in-line with recent advice that NatureScot have issued in response to queries from other developers regarding PVA analysis, the current advice is that where GreenVolt is considered to have AEoSI and compensation has been agreed as per the consent, then this is not required as part of the in-combination. However, all other impacts that are not compensated should still be included.	B of **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV).** Subsequent to this advice from NatureScot, the Berwick Bank Wind Farm has been consented, with their consent requiring that compensation be provided for those SPA populations on which the potential for an adverse effect was concluded (Marine Directorate 2025a,b). However, the NatureScot advice to the Applicant on this matter remains unchanged, as confirmed in an email from NatureScot on 1 September 2025. The cumulative assessment at the EIA scale has included effects from the consented Berwick Bank Wind Farm, in accordance with the advice from NatureScot. Although Berwick Bank would provide compensation for those SPA populations of kittiwake, guillemot, razorbill, puffin and gannet where a potential adverse effect was concluded in relation to that projected, this would only apply to a subset of all colonies contributing to the regional populations of these species. Therefore, on a precautionary basis, the potential compensation to be provided by Berwick Bank has not been taken into account for the Bellrock WFDA cumulative assessment. Similarly, all impacts from the Green Volt wind farm are included within the cumulative assessment. **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)** presents cumulative EIA scale data (including PVA outputs) both with and without Berwick Bank, should information on the effects excluding Berwick Bank be required. The in-combination assessments undertaken in the **Bellrock WFDA RIAA: Part 3 (Volume VI)** consider the impacts for scenarios with the Berwick Bank Wind Farm included and excluded. For the collision and displacement effects during the O&M phase, the outputs from both scenarios are presented for each SPA population assessed. However, the interpretation and conclusions focus on the ‘Berwick Bank excluded’ scenario for SPA populations for which the potential for an adverse effect from Berwick Bank was concluded and on the ‘Berwick Bank included’ scenario for SPA populations for which no adverse effect from Berwick Bank was concluded. This is on the basis that compensation will be provided for those SPA populations for which the potential for an adverse effect was concluded. Similarly (and in accordance with this advice from NatureScot), the impacts from the Green Volt wind farm are excluded for those SPA populations on

Consultee	Document/Date	Comment	How/Where Comment is Addressed
			which the potential for an adverse effect from Green Volt was concluded. Impacts from Green Volt are included in all other cases. **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)** presents full details of the in-combination data (including PVA outputs) both with and without Berwick Bank.
NatureScot	Email from NatureScot to the Applicant on 31 March 2025	The proportion of population modelled that NatureScot would anticipate being required to provide reliable outputs is likely to be greater than the 10% that Bellrock achieved. As such, in this instance, NatureScot are content that Bellrock use the matrix approach for the assessment of all distributional responses.	This advice was provided by NatureScot in response to concerns raised by the Applicant with NatureScot (email of 20 March 2025 from the Applicant) over SeabORD model outputs and run times. In accordance with this advice, the assessment of distributional responses (i.e. displacement effects during the O&M phase) is undertaken using the matrix approach (SNCBs, 2022), with the details of how this approach has been applied being in accordance with the NatureScot guidance note 8 (NatureScot (2023f). However, estimates of the mortality of seabird species that could potentially arise from displacement and barrier effects are presented for both the matrix approach and the SeabORD modelling tool (Searle et al. 2018) within **Appendix 10.3: Offshore Ornithology Displacement Assessment Report (Volume IV)**. Given that the assessment relies on the outputs from the matrix approach, it is those outputs which are the focus of **Appendix 10.3: Offshore Ornithology Displacement Assessment Report (Volume IV)**, with the SeabORD outputs presented for context only.
NatureScot	Email from NatureScot to the Applicant on 23 May 2025	Regarding the PVA requirements and Guidance Note 11, NatureScot are in the process of reviewing and updating Guidance Note 11. The requirement for modelling of the 'operational life' and 50-years will remain, the 50-year time period gives the opportunity to consider recovery in the populations once the wind farm has stopped operating. As such, NatureScot will require PVAs to model the 'operational life' (35 years in this instance) and 50 years.	The PVAs have been undertaken to cover the 35-year operational period and a subsequent 15-year recovery period without wind farm effects (i.e. a total of 50 years), in accordance with NatureScot advice. Outputs are presented for (i) the 35-year projection period (representing the end of the operational period) and (ii) the full 50-year projection period. For further details, see **Appendix 10.4: Offshore Ornithology Population Viability Analysis Technical Report (Volume IV).**

Consultee	Document/Date	Comment	How/Where Comment is Addressed
		The proposed analysis will account for operational impacts ending at year 35, and from year 35 to year 50 ongoing wind turbine impacts will not be assessed as the turbines are to be removed. NatureScot are content that this correctly accounts for the operational impact and can accept the approach that Bellrock set out in email of 12 May 2025. (Note email of 12 May detailed that definition of 'operational life' is from the commissioning of the last turbine to the decommissioning of the first turbine. The email also detailed that when considering the 50-year PVA, the Applicant proposed to account for the operational impact of the wind turbines ending at year 35. This will mean that the period from year 35 to year 50 will therefore not have ongoing wind turbine impacts assessed (as the turbines will have been removed)).	
NatureScot	Email from the Applicant to NatureScot on 27 January 2025.	The Applicant noted at the recent Offshore Wind Conference in Glasgow (January 2025) that the 'testing' phase of the CEF will take place this summer 2025. Therefore, the Bellrock Project will use the Interim CEF in-combination/cumulative totals of seabirds in the application as the CEF will not be available in time for the Bellrock project to use. NatureScot are content that the NEEOG led cumulative work packages are used by Bellrock to inform cumulative/in-combination assessments, should the Scottish Government led CEF tool not be available. The Applicant expect these packages, if used, to be included in the EIA Report as appendices.	As detailed above and in accordance with NatureScot advice, as the CEF was not available at the time of the assessment, the cumulative mortalities for displacement and collision impacts were taken from the totals collated by the NEEOG Interim CEF project, using the most recently available update to these totals (i.e. April 2025). For further details, see: ▪ **Section 10.9**; and ▪ **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV).**
NatureScot	Email from NatureScot to the Applicant on 1 September 2025	From NatureScot's perspective this is fine. Whilst we are content that you continue in-line with our advice (as noted below), we do also recommend that you seek confirmation from MDLOT as well	Advice received from NatureScot in response to an email of 28 August 2025 from the Applicant, stating that following the consent decision for the Berwick Bank Wind Farm, the Applicant's preference was to continue to follow the advice in email from NatureScot of 7 February 2025 of including both the with and without Berwick Bank impacts within the cumulative and in-

Consultee	Document/Date	Comment	How/Where Comment is Addressed
			combination impacts. This was because of the advanced stage of the assessments at this point in time. MD-LOT confirmed agreement with this approach on 17 December 2025. As detailed above, the NatureScot advice on this matter from 7 February 2025 has been followed.
NatureScot	Email from NatureScot to the Applicant on 10 December 2024.	The meetings minutes from the meeting held 29 October 2024 include a post meeting note highlighting that Bellrock have since decided to undertake CRM using the avoidance rates included within the SNCB joint guidance note. NatureScot welcome and are content with this approach.	Noted. For further details, see: ▪ **Appendix 10.2: Offshore Ornithology Collision Risk Modelling Technical Report (Volume IV);** and ▪ **Section 10.8.2.5**.
MD-LOT	Email from MD-LOT to the Applicant on 18 December 2025	MD-LOT is content with the approach to proceed with and without Berwick Bank for the cumulative and in-combination assessments.	As detailed above, this advice has been followed.

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10.4 Assessment Methodology

10.4.1 Impact Assessment Methodology

11. **Chapter 6: Environmental Impact Assessment Methodology (Volume II)** provides a summary of the general impact assessment methodology applied in the Bellrock WFDA EIA Report with some adaptations to make it applicable to ornithology receptors. The assessment will use the conceptual 'source-pathway-receptor' model. The model identifies potential impacts resulting from the proposed activities on the environment and sensitive receptors within it.

12. In addition, the offshore ornithology impact assessment has considered the legislative framework and published guidance as defined in **Table 10.1**.

13. Methods of quantitative assessment of effects are outlined in the relevant subsection for each impact scoped in in **Section 10.8**, and otherwise provided in full in their associated technical **Appendices: 10.1** to **10.5**.

14. The impact assessment has been undertaken in line with the most recent guidance Chartered Institute of Ecology and Environmental Management (CIEEM, 2022) and informed by expert opinion where necessary. Key guidance documents on specific areas of the assessment such as estimating displacement (NatureScot 2023d) and (SNCBs, 2022) and collision risk (NatureScot, 2025); (Band, 2012), (McGregor et al. 2018); (SNCBs, 2014) and (Wright et al. 2012) have also been utilised, as appropriate.

15. The assessment approach used the 'Source-Pathway-Receptor' model. The model identifies likely environmental effects on ornithology receptors resulting from the proposed construction, O&M and decommissioning of the Bellrock Wind Farm Infrastructure. This process provides an easy-to-follow assessment route between impact sources and potentially sensitive receptors, ensuring a transparent impact assessment. The parameters of this model have been defined as follows:

- **Source** – the origin of a potential impact (noting that one source may have several pathways and receptors). e.g. an activity such as cable installation and a resultant effect such as re-suspension of sediments;
- **Pathway** – the means by which the effect of the activity could impact a receptor. e.g. for the example above, re-suspended sediment could settle and smother the seabed; and
- **Receptor** – the element of the receiving environment that is impacted. e.g. for the above example, bird prey species living on or in the seabed are unavailable to foraging birds.

16. For each impact, the assessment identifies receptors sensitive to that impact and implements a systematic approach to understanding the impact pathways and the level of effect on given receptors.

10.4.1.1 Definitions of Sensitivity, Value and Magnitude

17. The characterisation of the existing environment helps to determine the receptor sensitivity in order to assess the potential impacts upon it.

18. Sensitivity is defined with regard to the ability of a receptor to adapt to change, tolerate, and/or recover from potential effects, as given in **Table 10.3**. In addition, for some assessments the value of a receptor may also be an element to add to the assessment where relevant. Receptor value considers whether, for example, the receptor is rare, has protected or threatened status, importance at local, regional, national or international scale (**Table 10.4**).

Table 10.3: Definition of Sensitivity Levels for Offshore Ornithology

Sensitivity	Definition
High	Individual receptor has very limited or no capacity to avoid, adapt to, accommodate or recover from the anticipated impact. Bird species has very limited or no tolerance of sources of disturbance such as noise, light, vessel movements, offshore structures and human activity or very high vulnerability to collision impacts.
Medium	Individual receptor has limited capacity to avoid, adapt to, accommodate or recover from the anticipated impact. Bird species has moderate tolerance of sources of disturbance such as noise, light, vessel movements, offshore structures and human activity or moderate vulnerability to collision impacts.
Low	Individual receptor has some tolerance to accommodate, adapt to or recover from the anticipated impact. Bird species has high tolerance of sources of disturbance such as noise, light, vessel movements, offshore structures and human activity or low vulnerability to collision impacts.
Negligible	Individual receptor is generally tolerant to and can accommodate or recover from the anticipated impact. Bird species has very high tolerance of sources of disturbance such as noise, light, vessel movements, offshore structures and human activity or low vulnerability to collision impacts.

Table 10.4: Definition of the Value Levels for Offshore Ornithology

Value	Definition
High	Internationally/nationally important ▪ Internationally designated sites within mean maximum foraging range +1 SD of the Bellrock WFDA in the breeding season; ▪ Regularly occurring species protected under international law (i.e. Annex I species listed as qualifying interests of SPAs within mean maximum foraging range +1 SD of the Bellrock WFDA for breeding species, or nearby non-breeding season SPA); ▪ Nationally designated sites within mean maximum foraging range +1 SD of the Bellrock WFDA; ▪ Species protected under national law; ▪ Regularly occurring Annex I or Birds Directive Migratory species which are not listed as qualifying interests of SPAs within mean maximum foraging range +1 SD of the Bellrock WFDA; and

Value	Definition
	▪ Birds of Conservation Concern (BoCC) 'Red' list (Stanbury et al. 2021) and/or Scottish Biodiversity List species that have nationally important populations within the Bellrock offshore aerial survey area (OASA).
Medium	Regionally important (for example BoCC 'Red' list (Stanbury et al. 2021) and/or UK Biodiversity Action Plan species that have regionally important populations within the OASA (i.e. are locally widespread and/or abundant).
Low	Locally important (the species is common throughout Scottish waters but forms a key component of the bird assemblage in the OASA)/rare but with high potential for mitigation.
Negligible	Not considered to be important (for example common or widespread). (the species is common throughout Scottish waters and does not form a key component of the bird assemblage in the OASA).

19. The magnitude and probability of an impact occurring is established through consideration of:

- Scale or spatial extent (small scale to large scale or a few individuals to most of the population);
- Duration (short term to long term);
- Likelihood of impact occurring;
- Frequency; and
- Nature of change relative to the baseline.

20. Definitions of the magnitude levels are given in **Table 10.5**.

Table 10.5: Definition of the Magnitude Levels for Offshore Ornithology

Value	Definition
High	Fundamental, permanent/irreversible changes, over the whole receptor, and/or fundamental alteration to key characteristics or features of the particular receptor's character or distinctiveness. A change in the size or extent of distribution of the relevant biogeographic population or the population that is the interest feature of a specific protected site that is predicted to irreversibly alter the population in the short-to-long term and to alter the long-term viability of the population and/or the integrity of the protected site. Recovery from that change predicted to be achieved in the long-term or irreversible following cessation of the project activity. Guide: Predicted increase to baseline mortality rate is above 10%.
Medium	Considerable, permanent/irreversible changes, over the majority of the receptor, and/or discernible alteration to key characteristics or features of the particular receptor's character or distinctiveness. A change in the size or extent of distribution of the relevant biogeographic population or the population that is the interest feature of a specific protected site that occurs in the short and long-term, but which is not predicted to alter the long-term viability of the population and/or the integrity of the protected site.

Value	Definition
	Recovery from that change predicted to be achieved in the medium-term (i.e. no more than five years) following cessation of the project activity. Guide: Predicted increase to baseline mortality rate is above 5%.
Low	Discernible, temporary (throughout project duration) change, over a minority of the receptor, and/or limited but discernible alteration to key characteristics or features of the particular receptor's character or distinctiveness. A change in the size or extent of distribution of the relevant biogeographic population or the population that is the interest feature of a specific protected site that is sufficiently small-scale or of short duration to cause no long-term harm to the feature/population. Recovery from that change predicted to be achieved in the short-term (i.e. no more than one year) following cessation of the project activity. Guide: Predicted increase to baseline mortality rate is between 1% and 5%.
Negligible	Discernible, temporary (for part of the project duration) change, or barely discernible change for any length of time, over a small area of the receptor, and/or slight alteration to key characteristics or features of the particular receptor's character or distinctiveness. Very slight change from the size or extent of distribution of the relevant biogeographic population or the population that is the interest feature of a specific protected site. Recovery from that change predicted to be rapid (i.e. no more than circa six months) following cessation of the project related activity. Guide: Predicted increase to baseline mortality rate is less than 1%.
No change	No measurable or discernible change from baseline conditions. The impact does not result in any alternation to the receptor.

10.4.1.2 Effect Significance

21. The potential significance of effect for a given impact, is a function of the overall sensitivity and the magnitude of the impact (see **Chapter 6: Environmental Impact Assessment Methodology (Volume II)** for further details). A matrix is used (**Table 10.6**) as a framework to determine the significance of an effect. Definitions of each level of significance are provided in **Table 10.7**. Impacts and effects may be either positive (beneficial) or negative (adverse). Impacts that are moderate or major adverse are considered to be **significant** in EIA terms.

Table 10.6: Matrix for Evaluating the Significance of an Effect

Sensitivity / Value	Magnitude				
	High	**Medium**	**Low**	**Negligible**	**No Change**
High	Major	Major	Moderate	Minor	No effect
Medium	Major	Moderate	Minor	Negligible	No effect
Low	Moderate	Minor	Minor	Negligible	No effect
Negligible	Minor	Negligible	Negligible	Negligible	No effect

Table 10.7: Definitions of Effect Significance

Effect Significance	Definition
Major	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible change in receptor condition.
No Effect	No change in receptor condition; therefore, no effect.

10.4.2 Cumulative Effects Assessment Methodology

22. The CEA considers the likely significant effects of impacts arising from the activities and infrastructure associated with the Bellrock WFDA cumulatively with other relevant plans, projects and activities. The general approach to the CEA for ornithology includes identifying potential cumulative effects, identifying a short list of plans and projects for consideration and evaluating the significance of cumulative effects. **Chapter 5: Environmental Impact Assessment Methodology (Volume II)** provides further details on the general approach to the CEA, including the CEA with the Bellrock Offshore Transmission Development Area (OfTDA) and Onshore Transmission Development Area (OnTDA).

23. As agreed with NatureScot in February 2025 (**Table 10.2**), the North East and East Ornithology Group (NEEOG) led cumulative work package has been used to inform cumulative/in-combination assessments for ornithology, therefore the ornithology CEA screening uses the NEEOG Interim CEF project, using the most recently update available, being April 2025[1]. Details are provided in an Annex to **Appendix 10.4: Offshore Ornithology Population Viability Analysis (Volume IV)** of the Bellrock WFDA EIA Report. It is noted that the assessment approach assumes a realistic worst-case (i.e. is precautionary). For other impact pathways the cut-off was set at December 2025. An evaluation of any likely changes to the in-combination assessment conclusions (i.e. for displacement and collision effects at the HRA scale, as presented in the **Bellrock WFDA RIAA: Part 3 (Volume VI)**) is presented in **Bellrock WFDA RIAA: Part 3 Appendix B: In-combination Assessment Update (Volume VI)**. This evaluation takes into account projects that have been submitted (Aspen, Ayre, Buchan and MarramWind), have updated assessment data (Muir Mhòr, Caledonia and Ossian), and projects for which consent has been received and the Competent Authority have confirmed features where AEoSI has been confirmed (and hence compensation will be required; Salamander and West of Orkney in Scotland and Five Estuaries and Outer Dowsing in England) between April 2025 and February 2026.

[1] No further offshore wind projects were submitted until August 2025, by which point the Bellrock modelling was completed on the agreed cut-off date and those projects could not be accounted for in the modelling.

24. The plans and projects selected as relevant to the CEA for ornithology are based upon the results of a screening exercise (see **Appendix 5.3: CEA Plans and Projects Screening (Volume IV)** for details). Each plan or project has been considered on a case-by-case basis for screening in or out of this assessment based upon data confidence, impact-receptor pathways and the spatial/temporal scales involved.

25. The likely significant effects of the Bellrock Wind Farm Infrastructure together with the Bellrock Offshore Transmission Infrastructure and Onshore Transmission Infrastructure, so far as these can be ascertained at this stage, are assessed as part of this Bellrock WFDA EIA Report.

26. Further assessment of the effects of the Bellrock Project as a whole will be included within the Bellrock OfTDA EIA Report and OnTDA EIA Report, which will include updated assessments of cumulative environmental impacts of the different components of the Bellrock Project.

27. In line with the methodology set out in **Chapter 5: Environmental Impact Assessment Methodology (Volume II)**, three tiers have been applied to the Bellrock WFDA CEA. As the site selection process for the Bellrock OfTDA and OnTDA is ongoing (see **Chapter 4: Project Description (Volume II)** for details), activities and infrastructure associated with the Bellrock OfTDA and Bellrock OnTDA will be treated as 'other projects' for the purposes of the CEA, but have been considered within Tier 1 where relevant, due to their essential requirement for the function of the Bellrock Wind Farm Infrastructure.

28. The three tiers for CEA are:

- **Tier 1 assessment**: The Bellrock WFDA plus plans/projects which are operational, under construction, those with consent or a consent application submitted but not yet determined, plus the Bellrock OfTDA and Bellrock OnTDA;
- **Tier 2 assessment**: The Bellrock WFDA plus all plans/projects assessed under Tier 1, plus projects with a Scoping Report and/or Scoping Opinion; and
- **Tier 3 assessment**: The Bellrock WFDA plus all plans/projects assessed under Tier 1 and Tier 2, plus those projects likely to come forward where a Crown Estate Scotland Option to Lease Agreement or equivalent has been granted.

10.4.3 Transboundary Effects Assessment Methodology

29. The transboundary effect assessment considers the potential for effects to occur as a result of the Bellrock Wind Farm Infrastructure on offshore ornithology receptors within the Exclusive Economic Zone of other European Economic Area (EEA) member states or other interests of EEA member states. **Chapter 5: Environmental Impact Assessment Methodology (Volume II)** provides further details on the approach to the transboundary effect assessment.

30. For offshore ornithology, the potential for transboundary effects has been identified in relation to any non-UK seabird colonies with potential connectivity to Bellrock WFDA during the breeding season (within mean maximum foraging range +1SD) and non-breeding season.

10.5 Scope of the Assessment

10.5.1 Study Area

31. Two study areas are defined for offshore ornithology:

- Offshore Regional Study Area (ORSA) – defined by the area within which breeding and non-breeding seabirds could be impacted by the Bellrock Wind Farm Infrastructure;
- Offshore Aerial Survey Area (OASA) – defined by the Bellrock WFDA plus a 4 km buffer within which the baseline DAS was undertaken.

32. During the breeding season, many seabird species have large foraging ranges which can extend several hundred kilometres from their colonies. Outside of the breeding season, seabirds are not constrained by colony location and can range widely within UK seas and beyond, depending on the species involved. Therefore, an ORSA must be considered as some seabird colonies may have connectivity with the Bellrock WFDA despite being located a significant distance away. For seabirds from SPA colonies, connectivity to the Bellrock WFDA in the breeding season has been determined based on published foraging ranges (Woodward et al. 2019 in line with NatureScot 2023b guidance) and is detailed within the **Bellrock WFDA HRA Screening Report (Volume VI)**. Connectivity to the Bellrock WFDA during the non-breeding season has been determined based on BDMPS of the appropriate marine region (Furness 2015), as advised by NatureScot (2023c) (**Section 10.6.1.4**).

33. The Bellrock OASA extended over an area of 658 km^2 and comprised the Bellrock WFDA plus a 4 km buffer. Sampling was based on 15 strip transects located within the Bellrock OASA. Transects were orientated in an approximate southwest to northeast direction (i.e. perpendicular to the coast) and spaced at 2.5 km intervals. This design aimed to maximise the chances that each transect sampled a similar range of habitats (primarily as determined by water depth), which should act to reduce the variation in estimated bird abundance between transects. The Bellrock OASA is detailed in **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)**.

10.5.2 Data and Information Sources

34. **Table 10.8** sets out the key desk-based information and data sources that have been used to inform the offshore ornithology baseline.

Table 10.8: Key Data and Information Sources Used to Inform the Offshore Ornithology Baseline

Dataset	Year(s)	Description
SPAs (NatureScot, Natural England)	2025	Conservation objectives and SPA citations for SPAs in Scotland and England.
Seabirds Count (Burnell et al. 2023)	2015 - 2021	Seabirds Count national colony census data.

Dataset	Year(s)	Description
SMP database - colony counts	2025 or most recent	The SMP is an ongoing annual monitoring programme, established in 1986, of 25 species of seabird that regularly breed in Britain and Ireland. The database includes colony counts going back to Operation Seafarer in the 1960s and a number of related surveys that have been conducted since the 1980s, in addition to the SMP itself.
Desk-based revision of seabird foraging ranges used for HRA screening (Woodward et al. 2019)	Various tagging studies 1973 - 2018	Mean-maximum and SD foraging range data for 27 seabird species, aggregated from foraging range tracking and telemetry studies of individuals undertaken globally.
BDMPS of seabird species (Furness 2015)	Various datasets to 2013	Estimated 'population scales' i.e. contribution of adult and immature seabirds from SPA and non-SPA breeding populations in Britain and Europe, to non-breeding populations in defined regions of British waters.
Review of Seabird Demographic Rates and Density Dependence (Horswill & Robinson 2015)	Various demographic studies to 2012	Demographic rates (reproductive rates and age-specific survival rates) of seabird species.
Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines (Johnston et al. 2014a) and (Johnston et al. 2014ab)	Various offshore surveys spanning 1998 - 2012	Modelled flight-height distributions of seabird species.

10.5.2.1 Site-specific Surveys

35. Site-specific surveys have been undertaken to support the desk-study by providing accurate and detailed environmental information. **Table 10.9** summarises the site-specific surveys relevant to offshore ornithology undertaken to date.

Table 10.9: Summary of Site-specific Surveys Used to Inform the Offshore Ornithology Baseline

Survey	Spatial Coverage	Year(s)	Description
DAS programme	Bellrock WFDA plus 4 km buffer	March 2022 to Feb 2024	Digital aerial survey methods were used, with surveys flown once per month over the 2-year survey period (giving a total of 24 surveys) (HiDef, 2024). Sampling was based on 15 strip transects located within the Bellrock OASA. Transects were orientated in an approximate southwest to northeast direction (i.e. perpendicular to the coast) and spaced at 2.5 km intervals. This design aimed to maximise the chances that each

Survey	Spatial Coverage	Year(s)	Description
			transect sampled a similar range of habitats (primarily as determined by water depth), which should act to reduce the variation in estimated bird abundance between transects. Images were captured using digital video to sample each transect, with the processed images giving a total strip width of 250 m for each transect. The DAS methodology followed NatureScot (2023a) advice and was agreed with NatureScot and MD-LOT (**Table 10.2**).

10.5.2.2 Assumptions and Limitations

36. The desk data sources used in this Chapter are detailed in **Table 10.8** to supplement site-specific baseline information from the DAS as summarised in **Table 10.9** and reported in full in **Appendix 10.1: Offshore Ornithology Digital Aerial Surveys Baseline Report (Volume IV)**.

37. The desktop data used are the most up to date publicly available information which can be obtained to inform assessments relating to regional seabird populations, foraging ranges, demographic rates, seasonality and at-sea behaviour. The population estimates for seabird SPA colonies used to inform the assessments are taken from the most recent colony count data in the Seabirds Count national census 2015-2021 (Burnell et al. 2023), or from the SMP where more recent data are available. Baseline characterisation of the OASA and resulting assessments of significance use site-specific data (DAS) conducted over a period of 24 months (March 2022 to February 2024). As sampling is undertaken once a month for a period of 24 months, it is considered to represent a snapshot of each month, noting that seabird numbers may fluctuate both spatially and temporally in response to environmental conditions. However, the sampling regime adopted was agreed with NatureScot as suitable for baseline characterisation and is identical to other baseline characterisation surveys at offshore wind farms projects which have also been previously agreed by SNCBs. DAS surveys will also be less than five years old at the point of submission, in accordance with NatureScot (2023a) guidance.

10.6 Existing Environment

10.6.1 Baseline Digital Aerial Surveys

38. To inform the offshore ornithology assessment, 24 months of site-specific surveys were undertaken between March 2022 and February 2024, as agreed with MD-LOT, and NatureScot. Full details of the baseline DAS methodology, programme and results are provided in **Appendix 10.1 Annex B: Density and Abundance Estimates by Survey (Volume IV)**. The following species identified during DAS have been included within the assessment:

- Gannet;
- Kittiwake;

- Great black-backed gull;
- Arctic skua;
- Arctic tern;
- Guillemot;
- Razorbill; and
- Puffin.

39. As set out in **Appendix 10.1 Annex B: Density and Abundance Estimates by Survey (Volume IV)**, a number of other species were also recorded during surveys, comprising oystercatcher, curlew, herring gull, common gull, little auk, red-throated diver and European storm-petrel. These species were recorded in very low numbers (in many cases a single individual over two years), and as such have not been considered further within the assessment. Fulmar was recorded regularly during surveys, but is not considered sensitive to the effects of offshore wind development, and has also, therefore, been excluded from further assessment.

10.6.1.1 Density and Abundance Estimates

40. Two broad approaches may be used for deriving estimates of the density (and hence abundance) of seabird species from the DAS data, i.e. design-based and model-based approaches (NatureScot, 2023d). NatureScot (2023d) guidance advocates for the use of model-based approaches where sample sizes are considered sufficient, specifically as derived using the MRSea package (Mackenzie et al. 2013). However, such advanced modelling approaches are not always well suited for use with DAS data, particularly in cases where either (i) bird densities are low; (ii) survey areas are relatively small; and/or (iii) there are few environmental gradients providing little potential for correlation with variation in bird densities. These are all factors that are relevant to the Bellrock OASA, and therefore, in agreement with NatureScot (refer to **Table 10.2**), design-based approaches were used for deriving density estimates for all species[2].

41. Availability bias correction factors were applied to the density and abundance estimates for guillemot, razorbill and puffin on the water to account for likely underestimation because a proportion of the individuals of these diving species are likely to be underwater at the time of image capture and, hence, undetected by the DAS. These correction factors are based on data on time spent underwater by these species. For guillemots and razorbills, correction factors of 0.7595 and 0.8182, respectively, were used based on data logger studies during the chick-rearing period (Thaxter et al. 2010), whilst for puffin a correction factor of 0.8584 was used, again based on data logger studies (as reported in Spencer, 2012).

[2] Density estimates for guillemot were generated by both design-based and model-based approaches, on the basis that guillemot was the most abundant and frequently occurring species in the Bellrock DAS results and, therefore, the most suitable species for the application of model-based methods. However, it was agreed with NatureScot (**Table 10.2**) that the model-based estimates offered no benefits (i.e. provided very similar outputs, with no directional bias in relation to the differences in outputs derived by the two methods, whilst model-based outputs had no greater precision than those derived by design-based methods) over design-based estimates and have not been used for the assessment. Refer also to **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)** for further information.

42. A summary of population estimate data for species considered in the displacement assessment (kittiwake, guillemot, razorbill, puffin and gannet) is provided in **Table 10.10**, with the derived seasonal mean peak population estimates presented in **Table 10.11**. Population estimates have been presented for the WFDA plus a 2km buffer, to align with the requirement for displacement assessment (NatureScot 2023f). Further details of method of density and abundance estimation are provided in **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)**.

43. A summary of seabird in-flight density estimates within the Bellrock WFDA for species subject to Collision Risk Assessment Seabird density is presented in **Table 10.12.**

44. Density and abundance estimate for the Bellrock WFDA, WFDA + 2km buffer and WFDA + 4km buffer (the OASA) from the DAS are presented in detail in **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)**.

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Table 10.10: Monthly Population Estimates for Each Assessed Species in Each Survey Month for the Bellrock Wind Farm Development Area plus 2 km Buffer (All Observations) Based upon Records as Apportioned to Each Species (Accounting for Availability Bias)

Species	Survey Year	Mar[1]	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Kittiwake	Year 1	129.29	97.30	137.08	590.81	19.09	0.00	18.95	28.31	28.36	111.52	0.00	9.36
	Year 2	39.52	29.48	9.27	38.00	0.00	0.00	0.00	76.36	10.16	0.00	9.69	0.00
Guillemot[2]	Year 1	2,273.79	1,576.29	483.26	131.95	16,393.41	828.47	1,661.74	1,883.33	2,594.13	686.65	728.06	535.94
	Year 2	465.05	260.45	1,002.62	134.00	133.01	165.08	141.13	105.70	199.78	12.60	246.93	295.22
Razorbill	Year 1	140.29	0.00	0.00	63.40	2,600.44	0.00	0.00	0.00	0.00	0.00	0.00	59.18
	Year 2	23.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.97	0.00	12.70	0.00
Puffin	Year 1	611.92	110.99	373.90	22.24	628.99	41.39	196.53	147.43	45.66	16.18	0.00	0.00
	Year 2	59.75	10.88	90.50	67.60	0.00	11.20	0.00	0.00	11.33	0.00	14.96	76.22
Gannet[3]	Year 1	163.04	361.18	185.08	87.79	134.50	39.20	19.08	48.01	0.00	19.02	9.84	9.71
	Year 2	155.71	66.89	57.38	0.00	67.57	10.05	0.00	399.35	0.00	9.72	0.00	0.00

Notes:

[1] Estimates are derived using design-based methods. The seasonal peaks for each survey year are shown in bold and cell colours indicate seasons. Dark blue = Breeding season; Mid blue = Autumn passage/Post-breeding dispersal; Light blue = Winter/Non-breeding season; Lightest blue = Spring passage.

[2] The seasonal periods used for guillemot follow Bellrock WFDA-specific advice provided by NatureScot (**Table 10.2**) but differ from that advised in NatureScot (2020) guidance. Applying the seasonal period in NatureScot (2020) would give breeding season peaks of 16,393 (Jul) and 1,003 (May) and non-breeding peaks of 2,594 (Nov) and 465 (Mar) in the first and second survey years, respectively.

[3] For Gannet, only two values are in bold for Year 2, which highlights that March, being split between the winter/non-breeding and breeding seasonal periods, represents the seasonal peak for both these periods. See in Year 1 that both March and April are in bold, therefore, March is the Winter/Non-breeding peak, and April that of the Breeding season.

Table 10.11: Mean Peak Population Estimates for Species Considered in the Displacement Assessment According to Seasonal Period for the Bellrock Wind Farm Development Area Plus 2 km Buffer

Species	Mean Peak Population Estimate (Number of Individuals)			
	Breeding Season	Autumn Migration/Post-breeding Dispersal	Winter/Non-breeding	Spring Migration
Kittiwake	314	94	N/A	84
Guillemot	790	5,075	938	N/A
Razorbill	1,300	0	6	82
Puffin	360	N/A	344	N/A
Gannet	258	224	N/A	159

Table 10.12: Mean Monthly In-flight Densities (Number of Individuals per km^2) and SD within the Bellrock Wind Farm Development Area for Each Species Scoped in for Collision Risk and for which there were any In-Flight Records within the Bellrock WFDA During the Baseline Surveys

Species		Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kittiwake	Mean	0.000	0.000	0.086	0.088	0.119	0.290	0.000	0.000	0.000	0.104	0.034	0.070
	SD	0.000	0.000	0.075	0.072	0.102	0.309	0.000	0.000	0.000	0.095	0.032	0.086
Great black-backed gull	Mean	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	SD	0.000	0.000	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Arctic tern	Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.035	0.018	0.000	0.000	0.000	0.000
	SD	0.000	0.000	0.000	0.000	0.000	0.000	0.044	0.029	0.000	0.000	0.000	0.000
Arctic skua	Mean	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.000	0.000	0.000	0.000	0.000
	SD	0.000	0.000	0.000	0.000	0.000	0.029	0.000	0.000	0.000	0.000	0.000	0.000
Gannet	Mean	0.000	0.000	0.150	0.086	0.206	0.050	0.068	0.035	0.000	0.353	0.000	0.017
	SD	0.000	0.000	0.146	0.053	0.121	0.066	0.037	0.034	0.000	0.426	0.000	0.027

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45. Species assessed for impacts are those which were recorded during the DAS, and which are considered to be at potential risk due to their abundance, or biological sensitivity to wind farm impacts (e.g. typical flight height or behaviour). The conservation status of these species is provided in **Table 10.13**. Abundances and distributions of all species observed are presented in **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)**.

Table 10.13: Summary of Nature Conservation Status of Seabird Species Considered at Risk of Potential Impacts

Species	Conservation Status
Kittiwake	BoCC5 Red listed and Birds Directive Migratory Species
Great black-backed gull	BoCC5 Addendum Red listed and Birds Directive Migratory Species
Arctic tern	BoCC5 Amber listed, Birds Directive Migratory Species and Birds Directive Annex 1
Arctic skua	BoCC5 Red listed and Birds Directive Migratory Species
Guillemot	BoCC5 Amber listed and Birds Directive Migratory Species
Razorbill	BoCC5 Amber listed and Birds Directive Migratory Species
Puffin	BoCC5 Red listed and Birds Directive Migratory Species
Gannet	BoCC5 Amber listed and Birds Directive Migratory Species

10.6.1.2 Biological Seasons

46. Impacts have been assessed in relation to relevant biological seasons, as defined by NatureScot (2020), and a summary of these seasons for seabird species is presented in **Table 10.14.** Species-specific biological seasons are based primarily on the definitions provided in Guidance Note 9 from NatureScot (2020), with this being used to define the breeding and (overall) non-breeding periods for each species. For most species, the defined non-breeding period is also sub-divided according to the different periods as identified in Furness (2015). These non-breeding periods are curtailed accordingly in any cases where they overlap with the NatureScot (2020) defined breeding season. The two exceptions in this regard are herring gull and guillemot. For herring gull, a single non-breeding period is assumed. For guillemot, an additional post-breeding dispersal period is included for this species following project-specific advice from NatureScot. The data on guillemot densities and abundance are presented according to both the NatureScot (2020) guidance and project-specific advice on seasonal periods. Seasons for two species (European storm-petrel *Hydrobates pelagicus* and little auk *Alle alle*) are not defined by NatureScot, so these species are not listed.

Table 10.14: Species-specific Bio-seasons Taken from NatureScot (2020) for the Breeding Season, and Adapted from Furness (2015) for All Non-breeding Season(s)

Species	Breeding Season	Autumn Passage (and Post-breeding Dispersal for Guillemot)	Migration Free Winter or Non-breeding Period	Spring Passage
Kittiwake	Mid Apr – Aug	Sept – Dec	-	Jan – mid Apr
Great black-backed gull	Apr – Aug	Sept – Nov	Dec	Jan – Mar
Arctic tern	May – Aug	early Sept	early Sept – Mar	Apr
Arctic skua	May – Aug	Sept – Oct	Nov – Mar	Apr
Guillemot[1]	Apr – Jun	Jul – Sep	Oct – Mar	-
Razorbill	Apr – mid Aug	Mid Aug – Oct	Nov – Dec	Jan – Mar
Puffin	Apr – mid Aug	-	Mid Aug – Mar	-
Gannet	Mid Mar – Sept	Oct – Nov	-	Dec – mid Mar

Notes:

[1] Data for guillemot are presented according to specific advice provided by NatureScot to the Bellrock WFDA. For reference, data utilising both the project-specific advice and NatureScot (2020) guidance are presented in **Appendix 10.1 Digital Aerial Survey Baseline Report (Volume IV)**.

10.6.1.3 Demographic Data

47. Age classification from images of individuals captured during the DAS was carried out for a subset of species (gannet, gull species and tern species). However, it is additionally only possible to determine age classes for a subset of the records from such surveys. Data were combined across the survey years for each seasonal period (e.g. seven months of surveys (March to September) fall into the breeding season for gannet, meaning age class proportions for the breeding season were derived from the data from a total of 14 surveys). Data from months that fall across two seasonal periods were assigned to both given periods when calculating the seasonally specific age class proportions (e.g. for gannet, the data for the March surveys contributed to estimates for both the spring passage and breeding periods). Occurrence of different age classes in the Bellrock OASA is reported for kittiwake, great black-backed gull, Arctic tern and gannet in **Appendix 10.1: Digital Aerial Survey Baseline Report (Volume IV)**.

48. Demographic data from Horswill and Robinson (2015) including age-specific annual survival rates, fledglings per breeding attempt, and age at first breeding, were also used in PVA.

10.6.1.4 Regional Population Estimates

49. The regional breeding season reference population for seabird species was calculated by summing the most recent available colony counts for the species from breeding colonies within mean-maximum foraging range (+1 SD) where available, as defined in Woodward et al. (2019)

(**Table 10.15**). However, in accordance with advice from NatureScot (**Table 10.2**), colony-specific values were used for gannet where these were available (**Table 10.15**), whilst for guillemot the maximum foraging range was used because there were no breeding colonies within the mean maximum foraging range + 1 SD of the Bellrock WFDA. With a small number of exceptions, count data were obtained from the SMP online database or, if no more recent estimates for the whole colony were available on the SMP database, from the Seabirds Count census (JNCC and BTO, 2025, accessed June 2025, Burnell et al. 2023). The numbers of immature birds in the regional breeding populations were calculated based on a) the number of breeding adults and b) the proportion of adults and immatures in the stable age structure of the population models on which the PVAs were based. Full details of the derivation of the regional populations are provided in Section 2.2.1 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Technical Report (Volume IV)**.

50. In addition, for the non-breeding period, the relevant BDMPS and associated population estimates are also provided, as taken from Furness (2015) (**Table 10.16**). For great black-backed gull, Arctic tern and Arctic skua these are used as the reference populations against which the percentage point change in mortality from the predicted effects is determined because all breeding colonies of these species are beyond the advised breeding season foraging range of the Bellrock WFDA (so there is no defined regional breeding population). For all remaining species (i.e. those where PVA has been required), these non-breeding season populations are also used in the estimation of the percentage increase in background mortality for collision and/or displacement mortality estimates, but this has been provided for information only. BDMPS data for the non-breeding season have not been used in subsequent assessment as the breeding season reference populations have been used for all periods to estimate percentage point change and in subsequent PVA, in accordance with previous NatureScot advice.

Table 10.15: Mean-maximum Foraging Range + 1 Standard Deviation (SD) Data or Alternative Used for Seabird Species

Species	Foraging Range (km)[a]
European storm petrel	336.0[b]
Leach's storm petrel	657.0[c]
Fulmar	542.3 ± 657.9
Manx shearwater	1346.0 ± 1018.7
Gannet ▪ Forth Islands SPA ▪ St Kilda SPA ▪ Grassholm SPA ▪ All other SPAs	 590.0[d] 709.0[d] 516.7[d] 315.2 ± 194.2
Shag	13.2 ± 10.5
Cormorant	25.6 ± 8.3

Species	Foraging Range (km)[a]
Kittiwake	156.1 ± 144.5
Black-headed gull	18.5[b]
Great black-backed gull	73.0[b]
Herring gull	58.8 ± 26.8
Lesser black-backed gull	127.0 ± 109
Sandwich tern	34.3 ± 23.2
Little tern	5.0[b]
Roseate tern	12.6 ± 10.6
Common tern	18.0 ± 8.9
Arctic tern	25.7 ± 14.8
Great skua	443.3 ± 487.9
Arctic skua	2 ± 0.7[c]
Guillemot ▪ SPAs north of Pentland Firth (inclusive of Fair Isle data) ▪ SPAs south of Pentland Firth (excluding Fair Isle data)	 73.2 ± 80.5 55.5 ± 39.7
Razorbill ▪ SPAs north of Pentland Firth (inclusive of Fair Isle data) ▪ SPAs south of Pentland Firth (excluding Fair Isle data)	 88.7 ± 75.9 73.8 ± 48.4
Black guillemot	4.8 ± 4.3
Atlantic puffin	137.1 ± 128.3
Notes: [a] Values are the mean maximum ±1 standard deviation unless otherwise indicated (from Woodward et al. 2019), as advised by NatureScot (2023b) Guidance Note 3. [b] Mean-maximum value only – no standard deviation available. [c] Mean value – no mean maximum or maximum values available. [d] Site-specific maximum values.	

Table 10.16: Breeding and Non-breeding Reference Populations for Seabird Species

Species	Breeding Season Reference Population (Breeding Adults + Immatures)[1]	Non-breeding Season Reference Population (Adult and Immature) (Furness 2015)[2]
Kittiwake	313,061 + 373,135	829,937 (autumn migration) 627,816 (spring)
Great black-backed gull	-	91,399 (non-breeding)
Arctic tern	-	163,930 (migration seasons)
Arctic skua	-	6,427 (autumn migration) 1,227 (spring migration)
Guillemot	1,003,449 + 980,436	1,617,306 (non-breeding season)
Razorbill	26,583 + 28,637	591,874 (autumn and spring migration) 218,622 (winter period)
Puffin	278,750 + 323,822	231,958 (non-breeding season)
Gannet	379,768 + 311,222	456,298 (autumn migration) 248,385 (spring migration)

Notes:

[1] Regional breeding populations are breeding adults (based on most recent population estimates at breeding colonies within mean maximum + 1 SD foraging range) plus immatures based on the number of breeding adults and the ratio of adults to immatures in the stable age structure. The exception is guillemot which has no breeding populations within mean maximum foraging range. Breeding adult guillemot numbers are estimated from the most recent counts available for populations within maximum foraging range, to allow "basic assessment of impact in the breeding season using the regional population", following NatureScot advice (**Table 10.2**). Details of the derivation of these population is given in Section 2.2.1 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Technical Report (Volume IV)**.

[2] Non-breeding season reference populations have been used to estimate percentage increase in background mortality for collision and/or displacement mortality estimates. This information has been provided for information only and has not been used in subsequent assessment, except in the case of great black-backed gull, Arctic tern and Arctic skua, for which the non-breeding reference populations have also been used to estimate the percentage point change in mortality (noting that all breeding colonies of these species are beyond the advised breeding season foraging range of the Bellrock WFDA). For all remaining species (those where PVA has been required), the breeding season reference population has been used for all periods to estimate percentage point change and in subsequent PVA, in accordance with NatureScot advice.

10.6.2 Designated Sites

51. Key designated sites identified for offshore ornithology are described in **Table 10.17**. Typically, these are the closest designated sites to the Bellrock WFDA that support important populations of breeding seabirds. Additional, more distant conservation sites considered for ornithological connectivity with the Bellrock WFDA are detailed in **Bellrock WFDA RIAA: Part 3 (Volume VI)**.

Table 10.17: Key Designated Sites and Relevant Qualifying Interest Features for Offshore Ornithology

Designated Site	Closest [Straight Line] Distance to Bellrock WFDA (km)	Relevant Qualifying Interest Feature(s)
Buchan Ness to Collieston Coast SPA	113.4	Kittiwake and fulmar.
Fowlsheugh SPA	121.7	Kittiwake, fulmar and razorbill.
Troup, Pennan and Lion's Heads SPA	148.4	Razorbill, fulmar and kittiwake.
St Abb's Head to Fast Castle SPA and Sites of Special Scientific Interest	154.1	Kittiwake.
Farne Islands SPA	154.1	Arctic tern, sandwich tern, kittiwake, puffin, lesser black-backed gull and fulmar.
Forth Islands SPA	157.8	Gannet, lesser black-backed gull, razorbill, puffin and kittiwake.
Coquet Island SPA	181.7	Arctic tern, common tern, Sandwich tern, fulmar, lesser black-backed gull and puffin.
East Caithness Cliffs SPA	237.9	Razorbill, kittiwake, fulmar and great black-backed gull.
North Caithness Cliffs SPA	251.9	Razorbill, puffin, kittiwake and fulmar.
Flamborough and Filey Coast SPA	280.2	Gannet, fulmar, razorbill and kittiwake.
Hermaness, Saxa Vord and Valla Field SPA	427.3	Gannet, great skua and fulmar.
Outer Firth of Forth and St Andrews Bay Complex SPA	116.9	Arctic tern, common tern, little gull, red-throated diver, Slavonian grebe, gannet, shag, eider, common scoter, velvet scoter, goldeneye, red-breasted merganser, black-headed gull, kittiwake, Manx shearwater, guillemot, razorbill, herring gull and common gull.

10.6.3 Seabird Colony Counts

52. NatureScot advised the use of Seabirds Count (Burnell et al. 2023) data to obtain estimates of breeding seabird population sizes (**Table 10.2**). Seabird colony count data for SPA and non-SPA colonies from Seabirds Count (or more recent data from the SMP database, where available) have been used in the apportionment of seabirds, and in the assessment of potential effects on designated sites in the **Report to Inform Appropriate Appraisal** (**RIAA**) **(Volume VI)**. Colony counts are presented in **Appendix 10.5: Offshore Ornithology**

Apportioning Technical Report (Volume IV) (with counts from colonies in SPAs of which the species is not a qualifying feature presented in **Annex A**).

10.6.4 Predicted Future Baseline

53. The EIA Regulations (The Electricity Works (EIA) (Scotland) Regulations 2017 and The Marine Works (EIA) Regulations 2007, require that "a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without development as far as natural changes from the baseline scenario can be assessed with reasonable effort ,on the basis of the availability of environmental information and scientific knowledge" is included within this Bellrock WFDA EIA Report.

54. In the event that the Bellrock Wind Farm Infrastructure is not constructed, an assessment of the future baseline conditions has also been carried out and is described within this section.

10.6.4.1 Key Drivers

55. The baseline environment is not static and will exhibit some degree of natural change over time, even if the Bellrock Wind Farm Infrastructure is not constructed, due to naturally occurring cycles and processes. In this context, the future baseline scenario at this particular location would involve environmental changes such as climate change, and established activities such as commercial fishing in the area, as well as the construction and O&M of up to three other offshore wind farms to the north and west of the Bellrock WFDA.

56. Scottish and UK waters are facing an increase in sea surface temperature. The rate of increases varies geographically, but between 1985 and 2009, the average rate of increase in Scottish waters has been greater than 0.2 °C per decade, with the southeast of Scotland having a higher rate of 0.5°C per decade (Baxter et al. 2011). A study completed over a longer period of time showed Scottish waters (coastal and oceanic) have warmed by between 0.05 and 0.07 °C per decade, calculated across the period 1870 - 2016 (Hughes et al. 2018). Changes in sea temperature will have an effect on fish at all biological levels (cellular, individual, population, species, community and ecosystem) both directly and indirectly. As sea temperatures rise, species adapted to cold water (e.g. cod and herring) will begin to disappear while warm water adapted species will become more established.

10.6.4.2 Species Threats

57. The following key threats have been identified for seabird species considered in the assessment:

- Kittiwake is considered to be particularly vulnerable to population decline, with UK population trends for kittiwake documented by Burnell et al. (2023) indicating that this species has declined by 42% since 2000. Effects in more northerly latitudes have been particularly marked, with declines of 80% and 89% reported from Shetland and Orkney respectively. Colonies on the east coast of Scotland have also shown substantial decline, with, for example, Caithness and Kincardine & Deeside showing declines of 42% and 47% respectively. Kittiwakes are very sensitive to climate change (Frederiksen et al. 2013 and Carroll et al. 2015) and to fishery impacts on sandeel stocks near breeding colonies (Frederiksen et al. 2004, Carroll et al. 2017, and Searle et al. 2023). The species has also lost the opportunity to feed on fishery discards since the Landing Obligation[3] came into effect in 2019;

- Gannet numbers have increased substantially in recent decades and may continue to increase for some years. However, there is evidence that this increase is already slowing (Murray et al. 2015), which may be exacerbated by HPAI impacts (see **Section 10.6.4.3**). The Landing Obligation may also have reduced discard availability to gannets in European waters. However, in recent years increasing proportions of adult gannets have wintered in west African waters rather than in UK waters (Kubetzki et al. 2009), probably because there are large amounts of fish discarded by west African trawl fisheries and decreasing amounts available in the North Sea (Kubetzki et al. 2009) and (Garthe et al. 2012). The flexible behaviour and diet of gannets probably reduce their vulnerability to changes in fishery practices or to climate change impacts on fish communities (Garthe et al. 2012);
- Terns, common guillemot, razorbill and puffin appear to be highly vulnerable to climate change, so numbers may decline over the next few decades and beyond (Burthe et al. 2014). Tern species recorded large declines in 2023 due to HPAI impacts, whereas guillemot trends were much more variable between colonies (Tremlett et al. 2024a) and (Tremlett et al. 2024 b); and
- Great black-backed gulls have experienced a long-term decrease in breeding numbers in the north of Scotland (Moffat et al. 2020), and the enforcement of the Landing Obligation will probably result in further decreases in numbers of north Norwegian great black-backed gulls, coming to the North Sea in winter. Great black-backed gulls also showed a widespread decline in 2023 compared to pre-HPAI baseline (Tremlett et al. 2024a) and (Tremlett et al. 2024 b).

58. While some mitigation for human impacts on seabirds may be possible (Ratcliffe et al. 2009 and Brooke et al. 2018), the scale has been small by comparison with the major influences of climate change and fisheries. Therefore, with the exception of gannet, numbers of almost all other seabird species in the UK North Sea region are likely to decline over the coming decades.

59. For offshore ornithology, the assessment is therefore carried out in a context of ongoing declines for most species. Where a species is declining, the assessment takes into account whether a given impact is likely to exacerbate a decline in the relevant reference population and prevent a species from recovery should environmental conditions become more favourable.

60. However, as noted above, climate change has been identified as a key driver for future seabird population trends, and the delivery of low-carbon renewable energy developments, such as offshore windfarms, is considered to be central to limiting such effects.

10.6.4.3 Highly Pathogenic Avian Influenza

61. Mortality linked to the H5N1 strain of HPAI virus outbreak was first reported among seabirds in great skuas *Stercorarius skua* breeding on Scottish islands, in July 2021 (Banyard et al. 2022). Although existing systematic reviews indicate that diseases are seldom a key factor leading to

[3] The Landing Obligation or ‘discard ban’ came into force on 1 January 2019 and prevents commercial fishing vessels discarding fish species subject to quota at sea.

the extinction of vertebrates, diseases can cause population crashes, leading to measurable declines in populations (Young and VanderWerf, 2023).

62. Thousands of seabird mortalities attributed to HPAI were reported across the UK in 2022, with minimum losses of almost 20,000 individuals in Scotland alone (NatureScot, 2023g) and by the end of 2022, 17 of the 25 UK breeding seabird species had tested positive for HPAI (APHA, 2023).

63. Further outbreaks of HPAI occurred during 2023. Comparisons were undertaken (Tremlett et al. 2024a and Tremlett et al. 2024b) of pre-HPAI colony population sizes with colony counts for the same species and colonies counted in 2023 (i.e. once colonies may have been impacted by HPAI). This showed declines in gannet of 25% across eight SPAs when compared against the Burnell et al. (2023) pre-HPAI baseline, whereas kittiwake increased by 10% across 21 SPAs and guillemot declined by 6% across 21 SPAs. It was concluded (Tremlett et al. 2024a, b) that changes in species such as guillemot may be partially due to other factors, as they were already in decline, whereas the decline in gannet is almost certainly attributable to HPAI due to the species showing recent population increases (which are a continuation of well documented long-term increases (Murray et al. 2015)).

64. The baseline DAS data was collected between March 2022 and February 2024 and therefore overlaps with the HPAI outbreak. Overall, the impact of the short, medium and long-term effects of the 2022 and 2023 HPAI outbreak on seabird colony abundance, productivity and survival in UK breeding colonies is unclear. It is also unclear currently how the distribution and abundance of seabirds at sea have been affected as a result of the HPAI outbreak. The disease has affected over 60 bird species in the UK, including species such as gannet, razorbill, guillemot, puffin, Manx shearwater, fulmar and small and large gull species (Pearce-Higgins et al. 2023). HPAI has affected gannet and great skua colonies profoundly and, based upon the initial observations and monitoring of these species since the advent of HPAI, it has been considered that both species now face increased risk of global extinction (Pearce-Higgins et al. 2023) (the UK supports 55.6% of the global gannet population and 60% of the global great skua population; JNCC, 2021).

65. There is considerable uncertainty as to how HPAI will impact long-term populations for affected species and colonies. This will be linked to the rate of natural immunity within each species, and other demographic factors that will determine the rate of colony recovery following any loss. Realistically, it may be several years before the full effects of HPAI on seabird populations are known. However, it is also the case that any population reduction is likely to result in a proportionate reduction in effects (i.e. fewer birds would be subject to potential displacement or collision impacts). Therefore, it is unlikely that impacts from the Bellrock Wind Farm Infrastructure (which in isolation are relatively small) would significantly interact with the effects of HPAI. Furthermore, Section 4.2.1 of the **Bellrock WFDA RIAA: Part 3**, **(Volume VI)**, reviews changes in the estimated sizes of some of the SPA colony populations of kittiwake, razorbill, puffin and gannet following the advent of HPAI which are predicted to be of most importance in terms of the occurrence of these species on the Bellrock WFDA during the breeding season. This indicated that for kittiwake, razorbill and puffin there was no tendency for lower population sizes post-HPAI, whilst the assessment is based on post-HPAI estimates for many of the SPA populations of these species. For gannet, which has shown marked declines following HPAI, the assessment uses post-HPAI estimates for the vast majority of the birds with potential

breeding season connectivity with the Bellrock WFDA. Given this, together with the timing of the baseline DAS, spanning the pre- and post-HPAI period, it was concluded that the effects of HPAI are unlikely to result in bias or flaws in the findings and conclusions of the **Bellrock WFDA RIAA: Part 3 (Volume VI)**, and it is considered reasonable to extend this conclusion to the assessment presented in this Chapter.

66. Consequently, no adjustments to account for impacts of HPAI on populations are considered necessary for the assessment.

10.7 Potential Impacts

10.7.1 Scope

67. **Table 10.18** sets out the impacts that have been scoped in and scoped out of the Bellrock WFDA EIA Report, in line with the Bellrock WFDA Scoping Opinion (**Appendix 1.2 (Volume IV)**).

Table 10.18: Potential Impacts Scoped in and Scoped Out of the Environmental Impact Assessment (EIA) for Offshore Ornithology

Potential Impact	Construction	Operation and Maintenance	Decommissioning
	Advised within the Bellrock WFDA Scoping Opinion		
Temporary disturbance and displacement	✓	✓	✓
Indirect impacts through impacts to habitats and prey species	✓	✓	✓
Indirect impacts from unexploded ordnance (UXO) clearance	✓	x	x
Disturbance and displacement from the physical presence of WTGs	x	✓	x
Barrier to movement	x	✓	x
Collision with WTGs	x	✓	x
Secondary entanglement with subsea infrastructure, specifically debris that may become attached to the FSS mooring lines	x	✓	x
Artificial lighting effects on nocturnal species	✓	✓	✓
Accidental pollution	x	x	x
Transboundary impacts	x	✓	x

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10.7.2 Realistic Worst-case Scenario

68. The final design of the Bellrock Wind Farm Infrastructure will be confirmed during detailed engineering studies post-consent. In order to undertake a robust and precautionary impact assessment, the realistic worst-case design scenario has been defined. Realistic worst-case scenario (i.e. those that have potential to cause the greatest impact) are derived from the Project Design Envelope to ensure that all other WTG design scenarios would have equal or less impact. Please see **Chapter 6: Environmental Impact Assessment Methodology (Volume II)** for further details on the design envelope approach.

69. The realistic worst-case scenario for the offshore ornithology assessment is summarised in **Table 10.19** below. These are based on the project design as described in **Chapter 4: Project Description (Volume II)**.

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Table 10.19: Realistic Worst-case Scenario for Impacts on Offshore Ornithology

Impact	Realistic Worst-case Scenario	Rationale
Construction		
Impact C1: Temporary disturbance and displacement	Indicative construction duration: site preparation works[1] to commence 2030, construction to occur from 2031 – 2037 inclusive (8 years of activity for Bellrock Wind Farm Infrastructure) Maximum extent of the Bellrock WFDA: 280 km^2 **Vessel movements:** ▪ Maximum number of round trips [2] for construction and site preparation vessels: 1,615; ▪ Maximum number of vessels on site at one time during construction and site preparation: 34; and ▪ Maximum number of helicopter round trips during construction: 816. **Piling:** ▪ Number of piles for maximum 132 Floating Offshore Units (FOUs) = 1,188 (9 anchors per FOU x 132 FOUs); ▪ Duration of anchor installation for single FOU = 3 days (3 piled anchors per 24 hours, for up to 9 anchors); ▪ Concurrent piling at up to two FOU locations; ▪ Maximum total active piling time per FOU (including soft-start and ramp-up): = 2.99 hours per pile, up to 8.97 hours piling per day; and ▪ Total piling time for 132 FOUs = 3,552.12 hours. **Inter-array cables (IACs):** ▪ Installation of up to 300 km of IACs, with burial of up to 225 km IACs with ploughing as the worst-case type; and ▪ Maximum length of unburied cable requiring protection: 26.2 km.	The worst-case is based on the design envelope options that would result in the installation of the greatest amount of Wind Farm Infrastructure, the greatest number of vessels, over the longest construction period. This includes: ▪ Installation of Wind Farm Infrastructure; and ▪ Construction vessel movements.

Impact	Realistic Worst-case Scenario	Rationale
Impact C2: Indirect effects through impacts to habitats and prey species	Refer to **Chapter 7: Benthic Ecology (Volume II)** and **Chapter 8: Fish and Shellfish Ecology (Volume II).**	Indirect effects on birds could occur through changes to the habitats and species considered within **Chapter 7: Benthic Ecology (Volume II)** and **Chapter 8: Fish and Shellfish Ecology (Volume II).**
Impact C3: Indirect impacts from UXO clearance	The primary method will be low-order deflagration, but high-order clearance is assessed as the realistic worst-case scenario. Vessel movements related to UXO clearance are considered under Impact C1.	Note that UXO clearance works will be subject to a separate Marine Licence (See **Chapter 4: Project Description (Volume II)**). A detailed UXO survey will be completed prior to construction to determine the maximum size of the UXO, number of UXOs to be cleared and clearance method, representing the maximum potential for indirect effects.
Impact C4: Artificial lighting	Marine lighting will comply with requirements set out by the Maritime and Coastguard Agency (MCA) in Marine Guidance Note (MGN) 654 (M+F) Offshore Renewable Energy Installations safety response (MCA, 2021).	An Outline Lighting and Marking Plan is submitted in **Volume V** and will be developed post-consent in consultation with the Civil Aviation Authority (CAA), MCA and Northern Lighthouse Board (NLB).
Operation and Maintenance		
Impact O1: Temporary disturbance and displacement	**Vessel movements** ▪ Maximum number of round trips for O&M vessels: 211 per year = 7,385 total trips during 35-year operational life; ▪ Maximum number of vessels on site at one time during O&M: 21; and ▪ Maximum number of helicopters round trips during O&M: 986 per year.	The greatest number of vessels, over the operational life, considering maintenance and repair vessel activity and anchoring.

<table>
<tr><th>Impact</th><th>Realistic Worst-case Scenario</th><th>Rationale</th></tr>
<tr><td>Impact O2: Indirect effects through impacts to habitats and prey species</td><td>Refer to Chapter 7: Benthic Ecology (Volume II) and Chapter 8: Fish and Shellfish Ecology (Volume II).</td><td>Indirect effects on birds could occur through changes to the habitats and species considered within Chapter 7: Benthic Ecology (Volume II) and Chapter 8: Fish and Shellfish Ecology (Volume II).</td></tr>
<tr><td>Impact O3: Disturbance and displacement from the physical presence of WTGs</td><td rowspan="2">▪ Maximum extent of the Bellrock WFDA: 280 km^2;
▪ Operational life: 35 years;
▪ Number of WTGs: Up to 132; and
▪ WTGs deployed across the full WFDA.</td><td rowspan="2"></td></tr>
<tr><td>Impact O4: Barrier to movement</td></tr>
<tr><td>Impact O5: Collision with WTGs</td><td>▪ Operational life: 35 years;
▪ Number of WTGs: Up to 132;
▪ Minimum air gap: 22 m above sea surface; and
▪ Maximum rotor diameter: 300 m;
▪ See also Table 2.3 of Appendix 10.2: Collision Risk Modelling Report (Volume IV).</td><td>Collision risk modelling shows that 132 x 15 MW WTGs (Turbine Type 1) has the largest theoretical collision impact risk for all species considered compared to 90 x 22 MW WTGs (Turbine Type 2) also modelled (see Appendix 10.2: Collision Risk Modelling Report (Volume IV)).</td></tr>
<tr><td>Impact O6: Combined collision and displacement</td><td>See Impact O3 to Impact O5.</td><td></td></tr>
<tr><td>Impact O7: Secondary entanglement with subsea infrastructure</td><td>Mooring lines:
▪ Maximum number of mooring lines = 1,188 for 132 floating offshore units (FOUs) (up to 9 mooring lines per FOU);
▪ Maximum mooring radius for each FOU = 1,300 m;
▪ Maximum length of each mooring line within the water column = 920 m;
▪ Mooring line material: Steel (e.g. chain, sheathed spiral strand wire rope, steel pipe); and Synthetic rope (e.g. polyester, nylon, high modulus polyethylene).</td><td>Infrastructure which may result in secondary entanglement includes mooring lines and IACs.</td></tr>
</table>

Impact	Realistic Worst-case Scenario	Rationale
	Inter-array cables: ▪ Maximum length of dynamic IAC in water column per IAC connection to an FSS = 350 m; ▪ Maximum external cable diameter = 270 mm; ▪ Maximum length of dynamic IACs for all FOUs = 92.40 km.	
Impact O8: Artificial lighting	Marine lighting will comply with requirements set out by the MCA in MGN 654 (M+F) Offshore Renewable Energy Installations safety response (MCA, 2021)	An **Outline Lighting and Marking Plan** is submitted as part of **Volume V** and will be developed post-consent in consultation with the CAA, MCA and NLB.
Decommissioning		
Impact D1: Temporary disturbance and displacement	The sequence of decommissioning is likely to be the reverse of the construction sequence, taking around seven years, with similar types and numbers of vessels and equipment expected to be involved. It is expected that the Bellrock Wind Farm Infrastructure will be fully removed at the end of its operational life. The removal and dismantling of the FOUs will largely be a reversal of the installation process. Generally, the FOUs will be towed from the Bellrock WFDA to a suitable port for decommissioning. Mooring lines and anchors will be recovered and removed from the WFDA. For FOU driven pile anchors, these are expected to be either fully removed or cut off below seabed level with a proportion remaining in-situ (due to anticipated excessive cost in their complete removal) following good practice and consideration of environmental conditions and sensitivities. Subsea cable hubs are expected to be fully removed from the seabed. The dynamic sections of the IACs within the water column will be cut at the connector with the static IAC and fully removed. The approach for decommissioning the static IACs on the seabed is yet to be determined, however, this will be reviewed throughout the lifetime of the Bellrock WFDA and good practice guidance at time of decommissioning will be followed. Subject to the material used and environmental sensitivities, it may be preferable to leave scour protection in-situ to preserve the marine habitat that may have developed over the life of the Bellrock WFDA. The approach for decommissioning cable protection will be similar to scour	The detail and scope of the decommissioning works would be determined by the relevant legislation and guidance at the time. For the purposes of the worst-case scenario, it is anticipated that the impacts would be comparable to those identified for the construction phase.

Impact	Realistic Worst-case Scenario	Rationale
	protection. Relevant stakeholders and regulators will be consulted to establish the best approach. Good practice guidance at time of decommissioning will be followed.	
Impact D2: Indirect impacts	Refer to **Chapter 7: Benthic Ecology (Volume II)** and **Chapter 8: Fish and Shellfish Ecology (Volume II).**	Indirect effects on birds could occur through changes to the habitats and species considered within **Chapter 7: Benthic Ecology (Volume II)** and **Chapter 8: Fish and Shellfish Ecology (Volume II).**
Impact D3: Artificial lighting	Marine lighting will comply with requirements set out by the MCA in MGN 654 (M+F) Offshore Renewable Energy Installations safety response (MCA, 2021)	An Outline Lighting and Marking Plan is submitted in **Volume V** and will be developed post-consent in consultation with the CAA, MCA and NLB.
Notes: [1] Site preparation works will commence up to one year before commencement of construction (year 0), at which point they may continue albeit as construction works (rather than site preparation works) these activities have been considered in the assessments of this Chapter, for completeness. [2] One round trip comprises two movements (i.e. one to and one from the Bellrock WFDA).		

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10.7.3 Embedded Mitigation Measures

70. This section outlines the embedded mitigation relevant to the offshore ornithology assessment (as shown in **Table 10.20** below). Where additional mitigation measures are proposed, these are detailed in the impact assessment (**Section 10.8**).

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Table 10.20: Embedded Mitigation Measures Relevant to Offshore Ornithology

Measure ID	Embedded Mitigation Measure(s)	Mitigation Type	Means of Implementation
WFDA-1	Minimum spacing of 1,150 m between FOUs (centre to centre) to reduce possibility of secondary entanglement.	Primary	Secured in the s.36 Consent and Marine Licence via a condition requiring a Development Specification and Layout Plan (DSLP) to be developed and submitted to the Scottish Ministers for approval prior to commencement of construction.
WFDA-4	Where seabed preparation is required (e.g. seabed levelling), methods and equipment that have been designed to minimise the potential for sediment suspension and dispersal will be adopted as far as is reasonably practicable.	Primary	Secured in the s.36 Consent and Marine Licence via a condition requiring a Construction Method Statement (CMS) to be developed and submitted to the Scottish Ministers for approval prior to commencement of construction.
WFDA-13	For all FSS designs (semi-submersible platform and barge that move with the tide and tension leg platform FSS design, which is restrained by tensioned moorings and does not notably move with the tide), the air gap will be maintained relative to the sea surface and will be minimum 22 m above all tidal levels. This project design envelope will therefore encompass the minimum 22 m air gap above mean high water springs required by the MCA.	Primary	Secured in the s.36 Consent and Marine Licence, via a condition requiring a CMS and DSLP to be developed and submitted to the Scottish Ministers for approval before commencement of construction.
WFDA-18	A VMNSP will be developed and implemented for the construction and O&M phases of the Bellrock Wind Farm Infrastructure. The VMNSP will set out the types and anticipated numbers of vessels to be deployed, together with indicative transit corridors between the Bellrock WFDA and the relevant construction ports. The VMNSP will be aligned with the Scottish Marine Wildlife Watching Code (Scottish Natural Heritage, 2017a) and the associated Guide to Best Practice for Watching Marine Wildlife (Scottish Natural Heritage, 2017b). As such, vessel operations will incorporate recognised good practice measures to reduce the risk of disturbance to, and collision with, marine mammals, seabirds, and other marine megafauna. Where practicable, vessel movements will follow defined transit corridors, thereby concentrating activity within established navigation corridors and reducing the spatial extent of potential disturbance and collision risk. The number of vessel movements will be limited to those necessary for safe and efficient delivery of the works.	Tertiary	Secured in the s.36 Consent and Marine Licence via a condition requiring a Vessel Management Plan (VMP) and Navigational Safety Plan (NSP) to be developed and submitted to the Scottish Ministers for approval before commencement of construction. An **Outline VMNSP (Volume V)** is submitted alongside the s.36 Consent application and Marine Licence application for the Bellrock Wind Farm Infrastructure.

Measure ID	Embedded Mitigation Measure(s)	Mitigation Type	Means of Implementation
WFDA-19	Development of and adherence to a MPCP outlining the approach for managing and reducing risk of pollution and procedures to protect personnel and to be followed in the event of a pollution incident.	Tertiary	Secured in the s.36 Consent and Marine Licence, via a condition requiring a MPCP to be developed and submitted to the Scottish Ministers for approval before commencement of construction. A **MPCP (Volume V)** is submitted alongside the s.36 Consent application and Marine Licence application for the Bellrock Wind Farm Infrastructure.
WFDA-21	An Environmental Management Plan (EMP) will be prepared and implemented to set out the procedures to avoid, reduce, and manage potential environmental effects arising across the construction and O&M of the Bellrock Wind Farm Infrastructure, in accordance with relevant international and national legislation and guidance.	Tertiary	Secured in the s.36 Consent and Marine Licence via a condition requiring an EMP to be developed and submitted to the Scottish Ministers for approval before commencement of construction. An **Outline EMP (Volume V)** is submitted alongside the s.36 Consent application and Marine Licence application for the Bellrock Wind Farm Infrastructure.
WFDA-26	A detailed Marine Mammal Mitigation Protocol (MMMP) will be prepared for UXO clearance. The MMMP for UXO clearance will ensure there are adequate mitigation measures to minimise the risk of any physical or permanent auditory injury to marine mammals as a result of UXO clearance. The most suitable mitigation measures, based upon best available information and methodologies at that time will be utilised. The MMMP for UXO clearance will be prepared in consultation with MD-LOT and NatureScot. The MMMP for UXO clearance will include details of all the required mitigation measures to minimise the potential risk of permanent threshold shift (PTS) as a result of underwater noise during UXO clearance. This would consider the options, suitability and effectiveness of mitigation measures such as, but not limited to: ▪ Avoidance of UXO if practicable; ▪ Use of low-order clearance techniques, such as deflagration; ▪ The potential use of noise abatement if any high-order detonation is required (taking into consideration the environmental limitations);	Tertiary	The Applicant will seek consent for UXO clearance activities via a separate Marine Licence application process. Secured in the UXO MMMP as part of a Marine Licence prior to construction. An **Outline MMMP (Volume V)** is submitted alongside the s.36 Consent application and Marine Licence application for the Bellrock Wind Farm Infrastructure.

Measure ID	Embedded Mitigation Measure(s)	Mitigation Type	Means of Implementation
	▪ Monitoring requirements for marine mammal observers; ▪ Requirements for acoustic deterrent device (ADDs); and ▪ Other UXO clearance techniques, or relocation of UXO. If more than one high-order detonation is required, other measures such as the use of scare charges; or multiple detonations, if UXO are located in close proximity, will also be considered.		
WFDA-28	Development of UXO Threat and Risk Assessment. All UXO detonations will be subject to a risk assessment undertaken in accordance with relevant guidance such as publication C754 Assessment and Management of UXO Risk in the Marine Environment (Construction Industry Research and Information Association, 2015).	Tertiary	A UXO Threat and Risk Assessment has been developed to support an indicative assessment of UXO clearance in the Bellrock WFDA EIA Report and will inform separate Marine Licence application(s) for UXO clearance.
WFDA-34	Adherence to the following international and national regulations and guidance, namely: ▪ International Convention for the Prevention of Pollution from Ships (MARPOL), which sets out requirements, including appropriate vessel maintenance; ▪ The International Convention for the Control and Management of Ships' Ballast Water and Sediments, which provides an international framework for the control of transfer of potentially invasive species from ballast water; and ▪ Consideration of guidance from the International Maritime Organisation (IMO, 2023) on the control and management of ships' biofouling to minimise the transfer of invasive aquatic species.	Tertiary	Secured in the s.36 Consent and Marine Licence via a condition requiring a VMNSP to be developed and submitted to the Scottish Ministers for approval before commencement of construction. An **Outline VMNSP (Volume V)** is submitted alongside the s.36 Consent application and Marine Licence application for the Bellrock Wind Farm Infrastructure.
WFDA-40	Development of, and adherence to, an LMP. The LMP will confirm compliance with legal requirements with regards to shipping, navigation and aviation marking and lighting. Failures of the lighting and marking within the Bellrock WFDA will be appropriately reported and rectified as soon as practicable. Interim hazard warnings will be put in place as required.	Tertiary	Secured in the s.36 Consent and Marine Licence, via a condition requiring a LMP to be developed and submitted to the Scottish Ministers for approval before commencement of construction. An **Outline LMP (Volume V)** is submitted alongside the s.36 Consent application and Marine Licence application for the Bellrock Wind Farm Infrastructure.

Measure ID	Embedded Mitigation Measure(s)	Mitigation Type	Means of Implementation
WFDA-46	The Applicant will ensure compliance with Marine Guidance Note 654 and its annexes, where applicable, including the completion post-consent of an Emergency Response Cooperation plan (ERCoP) and a search and rescue checklist in consultation with the MCA. The ERCoP will ensure the implementation of response protocols in the event of emergencies for offshore activities.	Tertiary	Submitted to the Scottish Ministers for approval via the VMNSP, which will address all the recommendations of the Maritime and Coastguard Agency (MCA) in Marine Guidance Note 654 (MCA, 2021). An **Outline VMNSP (Volume V)** is submitted alongside the s.36 Consent application and Marine Licence application for the Bellrock Wind Farm Infrastructure
WFDA-47	Development of, and adherence to, a Decommissioning Programme (DP). The DP will set out the framework for the safe, orderly, and environmentally acceptable decommissioning and removal of the Bellrock Wind Farm Infrastructure, in the interests of safety and environmental protection. Climate change risk measures will be included in the DP to be developed prior to the commencement of construction and will include a review of site-specific weather and metocean conditions, recent extreme weather events and up-to-date climate change projection data will be undertaken to ensure risk assessments, H&S protocols and guidelines on safe working practices are suitable for future climate conditions at the time of decommissioning works. The DP will be refreshed prior to decommissioning activities commencing. The DP will mitigate the risk of climate change impacts on decommissioning site personnel, plant and equipment and other assets and the risk of delays to the decommissioning programme due to extreme weather events, which are becoming more frequent and intense due to climate change.	Tertiary	Secured in the s.36 Consent and Marine Licence, via a condition requiring a DP to be developed and submitted to the Scottish Ministers for approval before commencement of construction.
WFDA-59	Seabed contacting infrastructure will be micro-sited, where practicable, to avoid sensitive seabed habitats, low or limited mobility benthic species, such as Annex I habitats and Priority Marine Features. Micro-siting will be informed by surveys prior to the commencement of construction which will identify the location and extent of habitats and species.	Primary	Secured in the s.36 Consent and Marine Licence via a condition requiring a CMS and DSLP to be developed and submitted to the Scottish Ministers for approval before commencement of construction.

Measure ID	Embedded Mitigation Measure(s)	Mitigation Type	Means of Implementation
WFDA-60	Development of, and adherence to, a CMS. The CMS will describe the methods for construction for all consented Wind Farm Infrastructure and set out the measures to be implemented to avoid or reduce adverse effects on the environment and legitimate users of the sea during the construction phase. This will include a clear definition of roles and responsibilities and reference to relevant H&S protocols. In relation to climate change, the CMS will incorporate measures to ensure construction activities are resilient to current and projected extreme weather and metocean conditions. This will include, as appropriate: ▪ Monitoring of site-specific weather and metocean conditions, including use of recognised forecasting and severe weather alert services; ▪ Programming and phasing of construction activities with regard to seasonality and short- to medium-term forecasts; ▪ Definition of safe working limits for vessel, lifting, and installation operations and procedures for suspension of works where thresholds are exceeded; ▪ Measures to secure plant, equipment, and materials during adverse weather; and ▪ Risk assessments and safety procedures that account for site-specific extreme weather risks. Through these measures, the CMS will mitigate risks to construction personnel, plant, and equipment, and reduce the potential for programme disruptions arising from extreme weather events.	Tertiary	Secured in the s.36 Consent and Marine Licence via a condition requiring a CMS to be developed and submitted to the Scottish Ministers for approval before commencement of construction.
WFDA-61	Regular and periodic inspections and maintenance of all components of the Wind Farm Infrastructure will be undertaken over their operational lifetime to identify and remediate any damage and deterioration and maintain good working conditions. These will be included in the Operation and Maintenance Plan (OMP). Monitoring of site-specific weather and metocean conditions, recent extreme weather events and up-to-date climate change projection data will be undertaken to provide a dynamic risk assessment of climate change impacts and inform operation and maintenance planning. The OMP will mitigate the risks of climate change impacts on the conditions and performance of the Wind Farm Infrastructure and ensures that it is adaptable to future climate conditions	Tertiary	Secured in the s.36 Consent and Marine Licence via a condition requiring an OMP to be developed and submitted to the Scottish Ministers for approval prior to the commissioning of the first WTG.

Measure ID	Embedded Mitigation Measure(s)	Mitigation Type	Means of Implementation
	and remains resilient over its operational life. The O&M strategy will be adaptive, with the frequency of maintenance, repair and replacement activities being adjusted based on need (i.e. increasing planned O&M visits for components with higher deterioration rates than anticipated).		
WFDA-62	Regular and periodic inspections and maintenance of the Wind Farm Infrastructure will be undertaken over its operational life to identify and remediate any damage and deterioration and maintain good working conditions (including any debris entangled with the Wind Farm Infrastructure). This will include but not be limited to surveys of subsea infrastructure.	Primary	Secured in the s.36 Consent and Marine Licence via a condition requiring an OMP to be developed and submitted to the Scottish Ministers for approval prior to the commissioning of the first WTG.
WFDA-69	Lighting as specified in the LMP will adhere to navigation and aviation legal requirements but will be minimised as far as possible beyond that to reduce potential effects to sensitive seabirds.	Tertiary	Secured in the s.36 Consent and Marine Licence, via a condition requiring a LMP to be developed and submitted to the Scottish Ministers for approval before commencement of construction. An **Outline LMP (Volume V)** is submitted alongside the s.36 Consent application and Marine Licence application for the Bellrock Wind Farm Infrastructure.

10.8 Assessment of Effects

71. The potential effects to offshore ornithology that may occur during construction, O&M and decommissioning of the Bellrock Wind Farm Infrastructure are assessed in the following sections. The assessment follows the methodology set out in **Section 10.4.1** and is based on the realistic worst-case scenarios defined in **Section 10.5.2**, with consideration of embedded mitigation measures identified in **Section 10.7.3.** As discussed in **Chapter 5: Project Description (Volume II)**, although site preparation works are undertaken ahead of the commencement of construction, these activities have been assessed as construction activities in the topic impact assessment chapters for completeness. Therefore, the impact assessments have assessed one year of site preparation works plus seven years of construction activities (overall eight years of activities) for Bellrock Wind Farm Infrastructure.

10.8.1 Construction

10.8.1.1 Impact C1: Temporary Disturbance and Displacement

72. Direct temporary disturbance or displacement of birds within the Bellrock WFDA area during the construction phases will occur as a result of a range of activities during the installation of Wind Farm Infrastructure, UXO detonation (if required), geophysical surveys and associated vessel and helicopter activities. Disturbance arising from these activities has the potential to affect identified key species directly (e.g. disturbance of individuals). The maximum WTG design scenario, outlined in **Section 10.7.2**, describes the elements of the Bellrock Wind Farm Infrastructure considered within this assessment.

10.8.1.1.1 Sensitivity

73. Some species are more susceptible to disturbance than others. There is evidence from studies that demonstrate that species such as divers and scoters may avoid shipping by several kilometres (e.g. Garthe and Hüppop, 2004) and (Schwemmer et al. 2011), while gulls are not considered susceptible to disturbance, as they are often associated with fishing boats (e.g. Camphuysen, 1995 and Hüppop and Wurm, 2000). In order to focus the assessment, a screening exercise was undertaken to identify those species likely to be susceptible to disturbance and displacement as a result of increased vessel activity associated with construction. This was based on previous sensitivity reviews such as Garthe and Hüppop (2004), who developed a scoring system for such disturbance factors, which is used widely in offshore wind farm EIAs. Similarly, Furness and Wade (2012) and Furness (2013) developed disturbance ratings for particular species based on Garthe and Hüppop (2004), alongside scores for habitat flexibility and conservation importance in a Scottish context. Bradbury et al. (2014) developed sensitivity scores for seabirds of English waters, expanding on the range of species covered cumulatively with Furness (2013).

74. Of the species recorded within the Bellrock WFDA, four have been identified as potentially sensitive to displacement during the construction phase – guillemot, razorbill, puffin and gannet. Sensitivity has been derived from published information on susceptibility to disturbance and habitat specialisation, including Furness et al. (2013), Bradbury et al. (2014), and SNCBs (2022) which summarises the species ranking of the former two studies. Overall, sensitivity is considered to be

medium for all four species. All other species are not considered sensitive to this impact pathway and have been screened out from further assessment.

75. The sensitivity to disturbance during the construction phase for guillemot, razorbill, puffin and gannet is therefore considered to be **medium**.

10.8.1.1.2 Magnitude of Impact

76. Activities resulting in the disturbance or displacement of birds from increased vessel activity and construction activity will occur intermittently throughout the construction phase. The offshore construction works which includes activities resulting in temporary disturbance or displacement of birds from increased vessel activity are assumed to be undertaken over a period of up to eight years between 2030 and 2037, which represents a reasonable worst-case for the purposes of assessment. A total of up to 1,615 vessel round trips may occur over the eight years of construction (inclusive of one year of site preparation works), whilst it is estimated that a maximum of 34 vessels could occur within the area of the Bellrock WFDA at any one time (**Table 10.19**). 1,615 vessel trips is equivalent to approximately one vessel movement every two days over a period of eight years. This is within the context of existing vessel traffic in the vicinity of the Bellrock WFDA, which averages approximately nine vessels per day during the summer months and three vessels per day during the winter (**Appendix 12.1: Navigational Risk Assessment (Volume IV)**). In addition, a total of up to 816 helicopter round trips may occur during the construction phase.

77. The impact is predicted to be of local spatial extent, intermittent, medium-term duration (although only a small proportion of the total area will be affected at any one time, with individual elements of construction having much shorter durations) and will affect any birds in the vicinity of these activities directly. As the level of vessel activity is unlikely to make a substantial change to background levels, the magnitude is considered to be **negligible** for each of the four assessed species.

10.8.1.1.3 Significance of Effect

78. Overall, it is predicted that sensitivity/value for guillemot, razorbill, puffin and gannet is **medium,** and the magnitude of impact is **negligible**. The effect is therefore of **negligible** significance, which is **not significant** in EIA terms.

10.8.1.2 Impact C2: Indirect Effects Through Impacts to Habitats and Prey Species

79. Indirect disturbance and displacement of birds may occur during construction of the Bellrock Wind Farm Infrastructure if there are impacts on prey species and the habitats of prey species. These indirect effects include those resulting from the production of underwater noise (i.e. because of construction activities) and the generation of suspended sediments (e.g. due to disturbance to the seabed during installation of turbines, cables and associated infrastructure) that may alter the behaviour or availability of bird prey species. Underwater noise may cause fish and mobile invertebrates to avoid the construction area and affect their physiology and behaviour. Suspended sediments may cause fish and mobile invertebrates to avoid the construction area and may smother and hide immobile benthic prey. These mechanisms could result in less prey being available within the construction area to foraging seabirds.

80. With regard to noise impacts on fish, underwater noise can potentially cause mortality, injury and behavioural responses amongst fish species and may be generated during the installation of anchors (i.e. pile driving), and by work vessels involved in the installation of the Wind Farm Infrastructure (i.e. vessel noise). Risk of mortality or injury of fish species may be associated with piling operations, although piling will be limited to the anchors and will be highly localised in its occurrence and limited to relatively short time periods during the construction phase. Additionally, the implementation of soft start procedures as part of the piling activity will allow fish to move away from the areas of highest noise levels, before the received noise reaches a level that would cause an injury, so substantially reducing the risk of mortality or injury. Overall, the impact magnitude of underwater noise due to construction activities is predicted to be negligible for all fish receptors (including spawning and nursey grounds), with the significance of the effect being **negligible adverse**, as set out in **Chapter 8: Fish and Shellfish Ecology (Volume II)**.

81. With regard to changes to the seabed, the installation of infrastructure within the Bellrock WFDA may lead to physical disturbance and temporary habitat loss as a result of a range of activities including seabed preparation (including sand wave levelling, slope levelling for gravity based anchors (if selected), boulder clearance, and pre-lay grapnel runs), UXO clearance, and the installation of the Wind Farm Infrastructure on the seabed. This also includes the temporary laying of mooring lines on the seabed prior to hook-up to the FOUs. As discussed in **Chapter 7: Benthic Ecology (Volume II)**, the total worst case physical disturbance and temporary habitat loss to benthic habitats from construction (and site preparation) activities is 3.64 km^2 within the Bellrock WFDA. It is noted that the disturbance would be intermittent throughout the site preparation and construction phase and would be located in discrete areas throughout the Bellrock WFDA (equating to 1.30% of the total footprint of the Bellrock WFDA) and is therefore considered to be highly localised. Recovery of seabed habitats will commence immediately following installation of infrastructure allowing key prey species to repopulate the areas of previous disturbance. Overall, the impact magnitude of changes to the seabed is predicted to be low, with the significance of the effect being **minor adverse**, as set out in **Chapter 7: Benthic Ecology (Volume II)**.

82. Increases in suspended sediment concentrations (SSCs) and associated sediment redeposition may also reduce the abundance and distribution of fish. The installation of the SKS and subsea cable hub(s) and the installation of IACs may result in short-term avoidance of affected areas by fish. The realistic worst- case WTG design scenario assessed in **Chapter 8: Fish and Shellfish Ecology (Volume II)** produced estimates of 3,635,158 m^2 for the maximum area (representing less than 1.3% of the Bellrock WFDA), and of 1,394,530 m^3 for the maximum volume, of sediment disturbed during the construction phase. Thus, increased SSC and associated sediment redeposition will encroach on a very small part of the Bellrock WFDA, with occurrence limited to areas close to the footprint of sand wave levelling, boulder clearance, cable installation and anchor placement. Furthermore, such effects are also predicted to be temporary and will dissipate rapidly due to the hydrodynamic conditions present at the Bellrock WFDA, with such levels of disturbance considered to be well within the range of natural variability regularly experienced in dynamic offshore environments (as detailed in **Chapter 8: Fish and Shellfish Ecology (Volume II)**. Thus, changes in SSC are concluded to have an effect of **negligible adverse** significance on the fish species receptors in **Chapter 8: Fish and Shellfish Ecology (Volume II)**.

83. Increases in SSC and associated reductions in water clarity may also affect the ability of foraging kittiwakes to locate fish at the sea surface, reducing the availability of key prey species. However, this is highly unlikely because, as described above, these effects will extend across a small area,

will be temporary in nature and are considered likely to be well within the range of natural variability regularly experienced at the Bellrock WFDA.

10.8.1.2.1 Sensitivity

84. No empirical information has been identified regarding the sensitivity of seabird receptors to indirect effects on prey and habitats. Generally, while such effects could reduce the suitability of an area for the affected species, effects would be localised, and all seabird receptor species would have the flexibility to utilise alternative prey resources and alternative areas in the vicinity. The sensitivity/value of all relevant seabird species (kittiwake, great black-backed gull, Arctic tern, Arctic skua, gannet, guillemot, razorbill and puffin) is therefore considered to be **medium**.

10.8.1.2.2 Magnitude of Impact

85. It is considered that the magnitude of impact on seabird receptors as a result of indirect impacts on habitats and prey species reflects the potential effects on the supporting features, as set out in **Section 10.8.1.2** above. As a worst-case, the magnitude of impact is, therefore, considered to be **low** (i.e. the magnitude of impact to seabed habitats, which is the highest level of impact for the supporting features considered).

10.8.1.2.3 Significance of Effect

Overall, it is predicted that sensitivity/value of relevant seabird receptors is **medium**, and the magnitude of impact is **low**. The effect (worst-case) is therefore of **minor adverse** significance, which is **not significant** in EIA terms.

10.8.1.3 Impact C3: Artificial Lighting

86. There is the potential that seabird species could be affected by artificial lighting during the construction phase of the Bellrock Wind Farm Infrastructure. Lighting of construction sites, vessels and other structures at night may potentially be a source of attraction (phototaxis), or displacement, for birds. However, the areas affected would be very small and restricted to offshore construction areas which are active at a given time. Phototaxis can be a serious hazard for fledglings of some seabird species (e.g. shearwater and petrel species) but typically occurs over short distances (hundreds of metres) in response to bright white light close to breeding colonies of these species. It has not been observed over large distances or in non-juvenile (i.e. adult and older immature) seabirds (Furness, 2018).

87. Any construction lighting would be the minimum to meet health and safety and regulatory requirements (see **Outline LMP**, **(Volume V)**), and construction activities associated with the Bellrock Wind Farm Infrastructure would be far enough removed from any seabird breeding colonies as to render this risk negligible. As set out in the and as set out in the HRA screening report for the Bellrock WFDA (**Bellrock WFDA RIAA: Part 1, Appendix B**), while the WFDA is within the theoretical foraging range of a number of SPA colonies for Manx shearwater, Leach's storm petrel and European storm petrel, tracking data for all three species strongly suggests that there would be no breeding season connectivity between these colonies and the Bellrock WFDA. Furthermore, the DAS found no evidence that these species regularly occur at the Bellrock WFDA, with a single record of European Storm Petrel and none of Manx shearwater or Leach's storm petrel during 24 months of survey. Whilst it is recognised that the DAS may under-record petrel species (due to their small size and dark colouration), the absence of records is considered to reflect the low incidence of these species.

88. There is no evidence that other seabird species are likely to be significantly affected by artificial lighting. Phototaxis may affect nocturnal migrating birds, especially in autumn during conditions of poor visibility, but has generally been seen where birds were exposed to intense white lighting such as from lighthouses; light from construction sites is likely to be one or two orders of magnitude less powerful than that from lighthouses (Furness, 2018).

10.8.1.3.1 Sensitivity

89. As seabird species sensitive to lighting effects are unlikely to occur at the Bellrock WFDA, the sensitivity/value is considered to be **negligible** for all receptors.

10.8.1.3.2 Magnitude of Impact

90. As no species sensitive to artificial lighting are predicted to regularly occur at the Bellrock WFDA, the magnitude of impact is considered to be **negligible** for all receptors**.**

10.8.1.3.3 Significance of Effect

91. Overall, it is predicted that sensitivity/value is **negligible,** and the magnitude of impact is **negligible** for all receptors. The effect is therefore of **negligible** significance, which is **not significant** in EIA terms.

10.8.1.4 Impact C4: Indirect Impacts from UXO Clearance

92. In addition to direct habitat loss and temporary disturbance as described in **Section 10.8.1.1**, UXO clearance during the construction phase has the potential to cause disturbance, auditory injury and/or mortality for sensitive benthic invertebrates, fish and shellfish species. The reduction or disruption of prey availability due to UXO detonations may cause reduced energy intake affecting productivity or survival of offshore ornithology receptors. It is noted that the need and extent of any UXO clearance is not known, and, if required, would be subject to a separate Marine Licence application. The assessment of this impact pathway is therefore provided for information only and would be subject to further assessment as part of the Marine Licence, should this be required.

10.8.1.4.1 Sensitivity

93. As with indirect impacts from construction activities outlined in **Section 10.8.1.2**, sensitivity of ornithological receptors is determined by their flexibility to utilise alternative prey resources and alternative areas. Generally, while UXO detonation effects on prey or habitats could reduce the suitability of an area for the affected species, effects would be localised, and all relevant seabird species (kittiwake, great black-backed gull, Arctic tern, Arctic skua, gannet, guillemot, razorbill and puffin) have the flexibility to utilise alternative prey resources and alternative areas in the vicinity. The sensitivity/value of all ornithological receptors is, therefore, considered to be **medium**.

10.8.1.4.2 Magnitude of Impact

94. The effects of UXO clearance on benthic subtidal ecology (including benthic invertebrate prey) are assessed in **Chapter 7: Benthic Ecology (Volume II)**. This impact pathway is assessed alongside other physical disturbance and temporary loss of seabed habitat effects and concludes a low magnitude impact and effect of **minor adverse** significance.

95. **Chapter 8: Fish and Shellfish Ecology (Volume II)** discuss the potential UXO impacts on fish relevant to ornithology as prey species during the construction phase. This assumes a worst-case,

including use of 'high order' detonation techniques (which is unlikely to be the case, as low order methods would be favoured wherever possible). This is assessed alongside other noise and vibration impacts and concludes a negligible magnitude impact on all fish receptors, resulting in a **negligible adverse** effect during the construction phase of the Bellrock Wind Farm Infrastructure.

96. Based on the information presented in **Chapters 7 and 8** the direct impact of UXO on fish and mobile invertebrates is expected to be of negligible to **minor adverse** significance. The impact on ornithological receptors is predicted to be of local spatial extent, medium duration, intermittent and reversible. The magnitude is therefore considered to be of **negligible** significance.

10.8.1.4.3 Significance of Effect

97. Overall, it is predicted that sensitivity/value of the receptor is **medium,** and the magnitude of impact is **negligible.** The effect is therefore of **negligible** significance, which **is not significant** in EIA terms.

10.8.2 Operation and Maintenance

10.8.2.1 Impact O1: Temporary Disturbance and Displacement

98. During the O&M phase of the Bellrock Wind Farm Infrastructure, temporary disturbance to seabird receptors may occur as a result of planned and unplanned maintenance and repair activities, requiring the use of vessels (and potentially helicopters, should these be required) within and around the Bellrock WFDA. Such impacts are considered to be comparable to activities during the construction phase, although the frequency of such activities would be less during the O&M phase.

10.8.2.1.1 Sensitivity

99. Refer to **Section 10.8.1.1.1** for a review of the sensitivity of seabird species to temporary disturbance impacts. In summary, four species are considered sensitive to such disturbance risk; guillemot, razorbill, puffin and gannet. All four species are assessed as having **medium** sensitivity. All other species are not considered sensitive to this impact pathway and have been screened out from further assessment.

10.8.2.1.2 Magnitude of Impact

100. Disturbance events would be expected to occur sporadically during the operational life of the Bellrock Wind Farm Infrastructure (a long-term effect), with each event expected to be of limited duration and spatial extent. For activities within and adjacent to the Bellrock WFDA, such as use of vessels including jack-up barges, or helicopters, any effects would also be limited by the disturbance and displacement effects of the Bellrock Wind Farm Infrastructure (refer to **Section 10.8.2.3**) (i.e. there could be no additional effect if birds were already displaced). Embedded mitigation, comprising the application of best practice measures for maintenance vessels throughout the life of the Bellrock Wind Farm Infrastructure, would also minimise the potential impact magnitude.

101. The magnitude of impact is therefore considered to be **negligible.**

10.8.2.1.3 Significance of Effect

102. Overall, it is predicted that sensitivity/value for guillemot, razorbill, puffin and gannet is **medium,** and the magnitude of impact is **negligible**. The effect is therefore of **negligible** significance, which is **not significant** in EIA terms.

10.8.2.2 Impact O2: Indirect Effects through Impacts to Habitats and Prey Species

103. Indirect disturbance and displacement of birds may occur during the O&M phase of the Bellrock Wind Farm Infrastructure if there are impacts on prey species and the habitats of prey species. These indirect effects include those resulting from the presence of Wind Farm Infrastructure on the seabed leading to permanent benthic habitat loss, the production of underwater noise (e.g. mooring line movement or vessel activity), electromagnetic fields (EMF) and the generation of suspended sediments (e.g. due to scour or maintenance activities) that may alter the behaviour or availability of bird prey species. Underwater noise and EMF may cause fish and mobile invertebrates to avoid the Bellrock WFDA and also affect their physiology and behaviour. Suspended sediments may cause fish and mobile invertebrates to avoid the Bellrock WFDA and may smother and hide immobile benthic prey. These mechanisms could result in less prey being available within the Bellrock WFDA to foraging seabirds, which may cause displacement from foraging grounds or reduced energy intake, affecting survival rates or productivity. Changes in fish and invertebrate communities due to changes in presence of hard substrate (resulting in colonisation by epifauna) may also occur, and changes in fishing activity could influence the communities present. Many of these impacts are analogous with those that would occur (temporarily) during the construction phase; refer to **Section 10.8.1.2** for further information.

104. With regard to noise impacts on fish, **Chapter 8: Fish and Shellfish Ecology (Volume II)** discusses the potential impacts on fish relevant to ornithology as prey species. This states that operational noise from FOUs is typically characterised by low sound pressure levels, and any noise associated with mooring line movement or vessel activity would be transient and highly localised; and that there is no evidence to suggest that such noise levels result in behavioural or physiological disruption to fish and shellfish species. Overall, the magnitude of impact is assessed as negligible and the effect of **negligible to minor Adverse** significance on the fish species receptors in **Chapter 8: Fish and Shellfish Ecology (Volume II)**.

105. The continuous footprint of the Bellrock Wind Farm Infrastructure on the seabed is considered an O&M impact and is predicted to result in permanent benthic habitat loss. The WCS total footprint of infrastructure on the seabed (anchors and associated scour protection, cable protection associated with IACs, and subsea cable hubs) during the O&M phase is 2.93 km^2 within the Bellrock WFDA. Many species of fish are reliant upon the presence of suitable subtidal habitat for foraging, spawning and nursing. However, these areas of habitat loss will be localised and discrete (equating to 1.05 % of the total footprint of the Bellrock WFDA), either in the immediate vicinity of anchors, mooring lines or subsea cable hub(s), or relatively small, isolated stretches of IAC within large areas of sediment which characterise the baseline environment (i.e. soft sediments), representing a very low proportion of available habitat. Permanent benthic habitat loss to key fish and shellfish prey species during the O&M phase has been assessed as being of **negligible** to **minor adverse** significance in **Chapter 8: Fish and Shellfish Ecology (Volume II)**.

106. With regard to the effects of introduction of hard substrates, including effects related to vertical water column mixing, on fish and shellfish ecology, the assessment within **Chapter 8: Fish and Shellfish Ecology (Volume II)**, determined that the magnitude of impact ranged from no change to negligible, with the level of effect ranging from **no effect** to **negligible beneficial** significance.

107. With regard to habitat loss and changes to the seabed and to SSCs, **Chapter 7: Benthic Ecology (Volume II)** discusses the nature of any change and impact. It concludes that impacts as a result of habitat loss, change in habitats due to presence of Bellrock Wind Farm Infrastructure and change in hydrodynamic conditions, would be of negligible magnitude. This would be an effect of **negligible to minor adverse** significance (**Chapter 7: Benthic Ecology (Volume II)**.

108. With regard to EMF effects from subsea cables, these have been identified as highly localised to the immediate vicinity of the IACs, and are further attenuated by cable burial (it is currently anticipated that the majority of the IACs will be buried up to 2.5 m below the seabed). While some fish species (particularly Elasmobranchs) are sensitive to EMF, such effects would be localised (less than 5 m) and no barrier effects, disruption to migration or population impacts are predicted. Overall, the magnitude of impact is assessed as negligible for all fish and shellfish receptors; a negligible Adverse effect (**Chapter 8: Fish and Shellfish Ecology (Volume II)**). Similarly, effects on benthic features are considered to be localised and of negligible magnitude; a **negligible adverse** effect (**Chapter 7: Benthic Ecology (Volume II)**).

10.8.2.2.1 Sensitivity

109. No empirical information has been identified regarding the sensitivity of seabird receptors to indirect effects on prey and habitats. Generally, while such effects could reduce the suitability of an area for the affected species, effects would be localised, and all species would have the flexibility to utilise alternative areas in the vicinity. The sensitivity/value of all relevant seabird species (kittiwake, great black-backed gull, Arctic tern, Arctic skua, gannet, guillemot, razorbill and puffin) is therefore, considered to be **medium**.

10.8.2.2.2 Magnitude of Impact

110. It is assumed that the magnitude of impact on seabird receptors as a result of indirect impacts on habitats and prey species reflects the potential effects on the supporting features, as set out in **Section 10.8.2.2** above. As a worst-case, the magnitude of impact is therefore, considered to be **negligible** (i.e. the magnitude of impact to fish and seabed habitats, which is the highest level of impact for the supporting features considered).

10.8.2.2.3 Significance of Effect

111. Overall, it is predicted that sensitivity/value of relevant seabird receptors is **medium,** and the magnitude of impact is **negligible**. The effect (worst-case) is therefore, of **negligible** significance, which is **not significant** in EIA terms.

10.8.2.3 Impact O3: Disturbance and Displacement from the Physical Presence of WTGs

112. The presence of operational WTGs and maintenance activities associated with their operation may disturb seabirds and displace them from their foraging or resting areas. This has the potential to affect productivity and/or survival. In addition, WTGs may pose a barrier to movement of seabirds, for example when travelling between breeding sites and foraging grounds, or when on migration.

It can be difficult to distinguish barrier effects from the effects of displacement, and therefore NatureScot (2023f) advise that such distributional responses are assessed together, and no separate assessment of barrier to movement for seabirds is carried out. An assessment of barrier effects on migratory non-seabird species is presented separately under Impact O4: Barrier to Movement in **Section 10.8.2.4**.

113. For each of the five key species assessed for displacement impacts during the O&M phase (kittiwake, guillemot, razorbill, puffin and gannet), reference populations (i.e. the regional populations) were required for comparison with the number of birds considered likely to suffer mortality. For the assessment, the total number of breeding adults from all colonies within mean maximum foraging range + 1 SD were used, as estimated by Woodward et al. (2019), with the exception of guillemot which instead used total number of breeding adults from colonies within maximum foraging range (**Table 10.16**), as advised by NatureScot (**Table 10.2**). Numbers of immatures associated with the regional populations were calculated based on a) the number of breeding adults; and b) the proportion of adults and immatures in the stable age structure of the population in unimpacted PVA modelling. The details of the derivation of these regional populations against which impacts are assessed are provided in **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)**.

114. For context, corresponding reference populations for the BDMPS seasonal periods that make up the non-breeding season taken from Furness (2015) are presented in **Table 10.16**. However, these values have not been used in the assessment of effects on non-breeding populations, which have used regional populations as defined in the paragraph above.

115. The overall baseline mortality rates presented for each species were derived from the relevant annual mortality rate calculation for each age class (Horswill & Robinson 2015), based on their proportion within the stable age structure (or, in the case of herring gull, great black-backed gull and Arctic tern, the proportion of immatures and adults in the BDMPS for the relevant seasonal period) as presented in **Table 10.21**. The potential magnitude of impact was estimated by calculating the increase in the average baseline mortality across all age classes based on the regional populations.

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Table 10.21: Average Mortality Rates Across All Age Classes of Key Species Considered for Displacement Assessment and Collision Assessment

Species	Parameter	Survival 0 to 1 yr	1 to 2 yr	2 to 3 yr	3 to 4 yr	4 to 5 yr	5 to 6 yr	Breeding Adults	Productivity	Average Mortality
Kittiwake	Demographic rate	0.790	0.854	0.854	0.854	N/A	N/A	0.854	0.819	0.157
	Population age ratio (Stable Age Structure)	0.187	0.143	0.118	0.097	N/A	N/A	0.456		
Guillemot	Demographic rate	0.560	0.792	0.917	0.939	0.939	0.939	0.939	0.659	0.139
	Population age ratio (Stable Age Structure)	0.167	0.090	0.069	0.061	0.056	0.051	0.506		
Razorbill	Demographic rate	0.794	0.794	0.895	0.895	0.895	N/A	0.895	0.643	0.177
	Population age ratio (Stable Age Structure)	0.155	0.120	0.093	0.081	0.071	N/A	0.481		
Puffin	Demographic rate	0.892	0.892	0.892	0.760	0.805	N/A	0.906	0.617	0.188
	Population age ratio (Stable Age Structure)	0.143	0.124	0.108	0.094	0.069	N/A	0.463		
Gannet	Demographic rate	0.424	0.829	0.891	0.895	0.919	N/A	0.919	0.698	0.187
	Population age ratio (Stable Age Structure)	0.192	0.081	0.067	0.059	0.052	N/A	0.550		

Notes:

Table based on demographic rates in Horswill & Robinson (2015). Further details on demographic rates used are provided in **Appendix 10.4: Offshore Ornithology Population Viability Analysis Technical Report (Volume IV)**.

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10.8.2.3.1 Sensitivity

116. The sensitivity of the five species considered for displacement (kittiwake, guillemot, razorbill, puffin and gannet) has been derived from published information on susceptibility to disturbance and habitat specialisation, including Bradbury et al. (2014), Furness et al. (2013) and SNCBs (2022). It is noted that for kittiwake, it is generally considered that this species has low susceptibility to displacement; however, taking into account the conservation importance of this species, and NatureScot's advice that this species should be considered in the displacement assessment, medium sensitivity has been assigned on a precautionary basis. For the other species considered, sensitivity is also considered to be medium, based on the published evidence above.

117. The sensitivity for each of the five species considered for displacement is therefore considered to be **medium**.

10.8.2.3.2 Magnitude of Impact

10.8.2.3.2.1 Kittiwake

118. As agreed with NatureScot (refer to **Table 10.2**), the estimated kittiwake mortality resulting from displacement during the O&M phase was assessed using the matrix approach. Seasonal displacement matrices for the Bellrock WFDA plus a 2 km buffer are presented in **Appendix 10.3: Offshore Ornithology Displacement Assessment Technical Report (Volume IV)**. The assessment was conducted using design-based estimates of abundance for all birds (in flight and on the water) in the Bellrock WFDA + 2 km buffer (as set out in **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)** and summarised in **Table 10.22,** and by applying the advised displacement and mortality rates to the mean peak abundance estimate for each seasonal period.

119. Assuming 30% displacement and 1% to 3% mortality of displaced birds, the predicted mean number of mortalities is 0.9 to 2.8 in the breeding season, 0.3 to 0.8 in the autumn migration season and 0.3 to 0.8 in the spring migration season, or 1.5 to 4.4 birds annually. Assuming a regional population of 829,937 (**Table 10.16**), and an average annual mortality rate of 0.157 (**Table 10.21**), this is equivalent to an annual increase in background mortality of 0.001% to 0.003% (refer to **Table 10.22**).

Table 10.22: Estimated Displacement Mortality for Kittiwake in the Bellrock Wind Farm Development Area by Seasonal Period in Relation to Baseline Mortality

Season	Estimated Seasonal Displacement Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality (%)
Breeding	0.9 – 2.8	686,236	107,739	0.001 – 0.003
Post-breeding dispersal	0.3 – 0.8	829,937	130,300	0.0002 – 0.0006
Non-breeding	0.3 – 0.8	627,816	98,567	0.0003 – 0.0008
Total	**1.5 – 4.4**	**829,937**	**130,300**	**0.001 – 0.003**

Notes:

[1] Assumes an annual average mortality rate of 0.139 (**Table 10.21**).

120. A total annual mortality of 1.5 to 4.4 birds is equivalent to an annual mortality of 1.03 to 3.08 adult birds from the breeding population with connectivity to Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.0003 to 0.001 (refer to Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)** for derivation of these values).

121. The impact is predicted to be of local spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, although is reversible following decommissioning and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, the percentage point increase in the rate of baseline breeding adult mortality is below 0.02, which is the threshold for which PVA is required under NatureScot guidance (NatureScot, 2023g). This magnitude of increase in mortality would not materially alter the background mortality of the population and would be undetectable. The magnitude of the impact is therefore considered to be **negligible.**

10.8.2.3.2.2 Guillemot

122. As agreed with NatureScot (refer to **Table 10.2**), the estimated guillemot mortality resulting from displacement during the O&M phase was assessed using the matrix approach. Seasonal displacement matrices for the Bellrock WFDA plus a 2 km buffer are presented in **Appendix 10.3: Offshore Ornithology Displacement Assessment Technical Report (Volume IV)**. The assessment was conducted using design-based estimates of abundance for all birds (in flight and on the water) in the Bellrock WFDA + 2 km buffer (as set out in **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)** and summarised in **Table 10.11**), and by applying the advised displacement and mortality rates to the mean peak abundance estimate for each seasonal period.

123. Assuming 60% displacement, 3% to 5% mortality of displaced birds in the breeding season and 1% to 3% of displaced birds in non-breeding seasons, and seasonal periods as advised by NatureScot (**Table 10.2** and **Table 10.14**), the predicted number of mortalities is 14.2 to 23.7 in the breeding season, 30.5 to 91.4 in the post-breeding dispersal season, and 5.6 to 16.9 in the non-breeding season. This is equivalent to an annual mortality of 50.3 to 132.0 birds. Assuming a regional population of 1,983,885 (**Table 10.16**), and an average annual mortality rate of 0.139 (**Table 10.21**), this represents an increase in background mortality of 0.02% to 0.05% (refer to **Table 10.23**).

Table 10.23: Estimated Displacement Mortality for Guillemot in the Bellrock Wind Farm Development Area by Seasonal Period in Relation to Baseline Mortality

Season	Estimated Seasonal Displacement Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality (%)
Breeding	14.2 – 23.7	1,983,885	275,760	0.005 – 0.009
Post-breeding dispersal	30.5 – 91.4	1,983,885	275,760	0.01 – 0.03
Non-breeding	5.6 – 16.9	1,617,306	224,806	0.003 – 0.008
Total	**50.3 – 132.0**	**1,983,885**	**275,760**	**0.02 – 0.05**

Notes:

[1] Assumes an annual average mortality rate of 0.139 (**Table 10.21**).

124. A total annual mortality of 50.3 to 132.0 birds is equivalent to an annual mortality of 24.94 to 65.93 adult birds from the breeding population with connectivity to the Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.0025 to 0.0066 (refer to Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)** for derivation of these values).

125. The impact is predicted to be of local spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, although is reversible following decommissioning and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, the percentage point increase in the rate of baseline breeding adult mortality is below 0.02, which is the threshold for which PVA is required under NatureScot guidance (NatureScot, 2023g). This magnitude of increase in mortality would not materially alter the background mortality of the population and would be undetectable. The magnitude of the impact is therefore considered to be **negligible.**

10.8.2.3.2.3 Razorbill

126. As agreed with NatureScot (refer to **Table 10.2**), the estimated razorbill mortality resulting from displacement during the O&M phase was assessed using the matrix approach. Seasonal displacement matrices for the Bellrock WFDA plus a 2 km buffer are presented in **Appendix 10.3: Offshore Ornithology Displacement Assessment Technical Report (Volume IV)**. The assessment was conducted using design-based estimates of abundance for all birds (in flight and on the water) in the Bellrock WFDA + 2 km buffer (as set out in **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)** and summarised in **Table 10.11**) and by applying the advised displacement and mortality rates to the mean peak abundance estimate for each seasonal period.

127. Assuming 60% displacement, 3% to 5% mortality of displaced birds in the breeding season and 1% to 3% of displaced birds in non-breeding seasons, and seasonal periods as defined in the NatureScot (2020) guidance, the predicted number of mortalities is 23.4 to 39.0 in the breeding season, 0.0 in the autumn migration season, 0.0 to 0.1 in the winter season and 0.6 to 1.8 in the

spring migration season. This is equivalent to an annual mortality of 24.0 to 40.9 birds; assuming a regional population of 591,874 (**Table 10.16**), and an average annual mortality rate of 0.177 (**Table 10.21**), this represents an increase in background mortality of 0.02% to 0.04% (refer to **Table 10.24**).

Table 10.24: Estimated Displacement Mortality for Razorbill in the Bellrock Wind Farm Development Area by Seasonal Period in Relation to Baseline Mortality

Season	Estimated Seasonal Displacement Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality (%)
Breeding	23.4 – 39.0	55,220	9,774	0.24 – 0.40
Autumn migration	0.0	591,874	104,762	0.0
Winter	0.0 – 0.1	218,622	38,696	0.0 – 0.0003
Spring migration	0.6 – 1.8	591,874	104,762	0.001 – 0.002
Total	**24.0 – 40.9**	**591,874**	**104,762**	**0.02 – 0.04**

Notes:

[1] Assumes an annual average mortality rate of 0.177 (**Table 10.21**).

128. A total annual mortality of 24.0 to 40.9 birds is equivalent to an annual mortality of 10.50 to 17.55 adult birds from the breeding population with connectivity to Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the adult population of 0.0395 to 0.0660 (refer to Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)** for derivation of these values).

129. As the percentage point increase in the rate of baseline mortality is above 0.02, PVA for razorbill has been undertaken, in accordance with NatureScot guidance (NatureScot, 2023g). The PVA has been carried out considering the advised displacement rate and the advised lower and upper mortality rates. The results of the PVAs for predicted displacement impacts from the Bellrock Wind Farm Infrastructure alone during the O&M phase for the razorbill regional population for the 35-year operational life of the Bellrock Wind Farm Infrastructure and 15 years post-operation recovery period is summarised in **Table 10.25**. Further details of the PVA methodology, input parameters and an explanation of how to interpret the PVA results can be found in **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)**.

Table 10.25: Population Viability Analysis for Predicted Displacement Mortality for Razorbill in the Bellrock Wind Farm Development Area

Projection Period	Impact Scenario	Median Population Size	Annual Growth Rate (Median)	Median Counterfactual Population Growth Rate (CPGR)	Median Counterfactual Population Size (CPS)
35 years	**Baseline (no impact)**	**75,596**	**1.0250**	**N/A**	**N/A**
	Displacement lower	74,445	1.0245	0.9995	0.9835
	Displacement upper	73,709	1.0242	0.9992	0.9727
50 years	**Baseline (no impact)**	**109,730**	**1.0249**	**N/A**	**N/A**
	Displacement lower	107,849	1.0246	0.9997	0.9838
	Displacement upper	106,619	1.0243	0.9995	0.9727

130. During the 35-year operational life of the Bellrock Wind Farm Infrastructure, the razorbill regional population is predicted to increase under the unimpacted scenario. Under both the lower and upper estimates of displacement mortality, the population is still predicted to increase, with only a very small reduction in growth rate (99.92% and 99.95%) and population size (97.27% and 98.35%) relative to the unimpacted population. These values indicate that the PVA predicts a very small reduction in the size of the population after 35 years, relative to the population size predicted to occur in the absence of any wind farm effects after 35 years. During the 15-year recovery period following the Bellrock Wind Farm Infrastructure’s operational life, the PVA indicates that there would be a slight recovery in the counterfactuals of the population growth rate and population size, but this would remain slightly below the predicted rates under the unimpacted scenario. While this indicates that there would not be a complete recovery during the first 15 years of the post-operation recovery period, the differences are so small that it is highly unlikely they would be detectable at a population level.

131. The impact is predicted to be of local spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, although is reversible following decommissioning and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, as the population changes are highly unlikely to be detectable at a population level the magnitude of the impact is therefore considered to be **negligible.**

10.8.2.3.2.4 Puffin

132. As agreed with NatureScot (refer to **Table 10.2**), the estimated puffin mortality resulting from displacement during the O&M phase was assessed using the matrix approach. Seasonal displacement matrices for the Bellrock WFDA plus a 2 km buffer are presented in **Appendix 10.3: Offshore Ornithology Displacement Assessment Technical Report (Volume IV)**. The assessment was conducted using design-based estimates of abundance for all birds (in flight and on the water) in the Bellrock WFDA + 2 km buffer (as set out in **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)** and summarised in **Table 10.11**) and by applying the advised displacement and mortality rates to the mean peak abundance estimate for each seasonal period.

133. Assuming 60% displacement, 3% to 5% mortality of displaced birds in the breeding season and 1% to 3% of displaced birds in non-breeding seasons, and seasonal periods as defined in the NatureScot (2020) guidance, the predicted number of mortalities is 6.5 to 10.8 in the breeding season, and 2.1 to 6.2 in the non-breeding season. This is equivalent to an annual mortality of 8.6 to 17.0 birds; assuming a regional population of 602,572 (**Table 10.16**), and an average annual mortality rate of 0.188 (**Table 10.21**), this represents an increase in background mortality of 0.008% to 0.016% (refer to **Table 10.26**).

Table 10.26: Estimated Displacement Mortality for Puffin in the Bellrock Wind Farm Development Area by Seasonal Period in Relation to Baseline Mortality

Season	Estimated Seasonal Displacement Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality (%)
Breeding	6.5 – 10.8	602,572	113,284	0.006% – 0.010
Non-breeding	2.1 – 6.2	231,958	43,608	0.005% – 0.014
Total	**8.6 – 17.0**	**602,572**	**113,284**	**0.008% – 0.016**

Notes:

[1] Assumes an annual average mortality rate of 0.188 (**Table 10.21**).

134. A total annual mortality of 8.6 to 17.0 birds is equivalent to an annual mortality of 4.61 to 9.99 adult birds from the breeding population with connectivity to the Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.0017 to 0.0036 (refer to Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)** for derivation of these values).

135. The impact is predicted to be of local spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, although is reversible following decommissioning and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, the percentage point increase in the rate of baseline breeding adult mortality is below 0.02, which is the threshold for which PVA is required under NatureScot guidance (NatureScot, 2023g). This magnitude of increase in mortality would

not materially alter the background mortality of the population and would be undetectable. The magnitude of the impact is therefore considered to be **negligible**.

10.8.2.3.2.5 Gannet

136. As agreed with NatureScot (refer to **Table 10.2**), the estimated gannet mortality resulting from displacement during the O&M phase was assessed using the matrix approach. Seasonal displacement matrices for the Bellrock WFDA plus a 2 km buffer are presented in **Appendix 10.3: Offshore Ornithology Displacement Assessment Technical Report (Volume IV)**. The assessment was conducted using design-based estimates of abundance for all birds (in flight and on the water) in the Bellrock WFDA + 2 km buffer (as set out in **Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report (Volume IV)** and summarised in **Table 10.11**), and by applying the advised displacement and mortality rates to the mean peak abundance estimate for each seasonal period.

137. Assuming 70% displacement, and 1% to 3% mortality of displaced birds, and seasonal periods as defined in the NatureScot (2020) guidance, the predicted number of mortalities is 1.8 to 5.4 in the breeding season, 1.6 to 4.7 in the autumn migration season and 1.1 to 3.3 in the spring migration season. This is equivalent to an annual mortality of 4.5 to 13.4 birds; assuming a regional population of 690,990 (**Table 10.16**), and an average annual mortality rate of 0.187 (**Table 10.21**), this represents an increase in background mortality of 0.003% to 0.010% (refer to **Table 10.27**:).

Table 10.27: Estimated Displacement Mortality for Gannet in the Bellrock Wind Farm Development Area by Seasonal Period in Relation to Baseline Mortality

Season	Estimated Seasonal Displacement Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality (%)
Breeding	1.8 – 5.4	690,990	129,215	0.001 –0.004
Autumn migration	1.6 – 4.7	456,298	85,328	0.002 – 0.006
Spring migration	1.1 – 3.3	248,385	46,448	0.002 –0.007
Total	**4.5 – 13.4**	**690,990**	**129,215**	**0.003 – 0.010**

Notes:

[1] Assumes an annual average mortality rate of 0.187 (**Table 10.21**).

138. A total annual mortality of 4.5 to 13.4 birds is equivalent to an annual mortality of 3.15 to 9.40 adult birds from the breeding population with connectivity to the Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.0008 to 0.0025 (refer to Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)** for derivation of these values).

139. The impact is predicted to be of local spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, although is reversible following decommissioning and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, the percentage point increase in the rate of baseline breeding adult mortality is below 0.02, which is the threshold for which PVA is required under NatureScot guidance (NatureScot, 2023g). This magnitude of increase in mortality would not materially alter the background mortality of the population and would be undetectable. The magnitude of the impact is therefore considered to be **negligible**.

10.8.2.3.3 Significance of Effect

140. For each of the five species considered for displacement (kittiwake, guillemot, razorbill, puffin and gannet) the sensitivity/value of the receptor is **medium,** and the magnitude of impact is **negligible**. The effect is therefore of **negligible** significance, which is **not significant** in EIA terms.

10.8.2.4 Impact O4: Barrier to Movement (Migratory Non-seabirds)

141. The presence of operational WTGs within the Bellrock WFDA may result in additional energy and/or time expenditure as migrating non-seabirds fly longer distances either over, under, or around the WTGs. This has the potential to affect productivity and/or survival.

142. For breeding seabirds, NatureScot (2023f) consider barrier effects alongside displacement as “distributional responses”. This is because it can be difficult to distinguish barrier effects from the effects of displacement, for breeding seabirds foraging in the region. NatureScot (2023f) advise that distributional responses are assessed using the matrix approach, and therefore for breeding seabirds, no separate assessment of barrier to movement is carried out, with impacts considered to be included in the assessment carried out under Impact O3: Disturbance and Displacement from the Physical Presence of WTGs in **Section 10.8.2.3**.

143. SNCBs (2022) define barrier effects as *“A barrier is a physical factor that limits the migration, or free movement of individuals or populations, thus requiring them to divert from their intended path in order to reach their original destination. This effect is expected to increase the energy expenditure of birds if they have to fly around the area in question in order to reach their goal”*. It is typically considered to affect birds in flight only, for example when on migration between breeding and wintering areas or between a breeding colony and a foraging area. Additional energetic costs could have long-term implications for individuals, impacting bird fitness (breeding productivity and survival) and for populations. Barrier effects are considered to be less impactful when affecting migratory flights, as avoidance of a single wind farm may be trivial relative to the total length and cost of the journey (Masden et al. 2010) and (Masden et al. 2012).

144. A barrier effect on migrating birds understood as an enforced detour around, rather than through, the wind turbine array of an offshore wind farm. (Masden et al. 2010) and (Masden et al. 2012) and Speakman et al. (2009) calculated that the costs of one-off avoidances during migration were small, accounting for less than 2% of available fat reserves. The effects of route deviation by migratory bird species would be very unlikely to result in any significant effect. This is because migrant birds will generally move between ‘stop-off’ points along the migration route, along which they will feed and replenish their fat reserves. Loss of a small percentage of the fat reserve would only be an issue if birds were to reach the next stop-off with fat reserves depleted close to zero. However, birds need to allow a significant buffer in reserve for each stage of the migration, for example to

account for the risk of unfavourable weather, and migratory routes do not have a fixed length, as birds from the same population can cover slightly different distances depending, for example, on local weather conditions. For example, if Barnacle geese migrating from Svalbard to Scotland flying c. 3,100 km (Tombre et al. 2019, Shariatinajafabadi et al. 2014, Hübner et al. 2010) to and from their breeding sites in the Arctic were required to detour of 5 km, this would add less than 0.1% to the overall distance covered by the birds. This translates to insignificant increase in energy expenditure for each seasonal migration.

145. This minimal increase in energy expenditure is unlikely to result in notable mortalities. It is also unlikely that the presence of multiple wind farms would affect this conclusion. This issue is addressed specifically by Speakman et al. (2009) who stated, *'Even if birds encountered multiple facilities the modelling suggests no major impact'*. This is for the reasons above, but it is also the case that for a bird travelling along a straight migration route, the chances of it encountering multiple wind farms (given that, even with the proposed future growth of projects the substantial majority of the sea area would be wind farm-free) would be low.

10.8.2.4.1 Sensitivity

146. Migratory non-seabirds are deemed to be of low vulnerability, low to high recoverability and of regional to international value. Due to the insignificant additional energy expenditure required to detour around a physical barrier along the migratory route, the receptor sensitivity is assessed as **low.**

10.8.2.4.2 Magnitude of Impact

147. In the absence of quantitative information available for individual species, the magnitude is considered qualitatively for all receptors. For the reasons set out above, it is considered unlikely that barrier effects would have a measurable effect on populations of migratory species. The impact is predicted to be of local spatial extent, long-term duration, continuous and reversible. It is predicted that the impact will affect the receptor directly. Due to the likely absence of any detectable impact on the fitness of individuals and the demography of the populations, the magnitude is therefore, considered to be **negligible**.

10.8.2.4.3 Significance of Effect

148. Overall, it is predicted that sensitivity/value of the receptor is **low** and the magnitude of impact is **negligible**. The effect is therefore of **negligible** significance, which is **not significant** in EIA terms.

10.8.2.5 Impact O5: Collision with WTGs

149. Collisions between seabirds and operational WTGs can result in direct mortality, which could reduce seabird numbers and potentially affect population breeding success. In order to inform the assessment, collision risk modelling (CRM) has been undertaken to predict the mortality of seabird species recorded during the DAS and considered potentially sensitive to collision impacts (kittiwake, great black-backed gull, Arctic tern, Arctic skua and gannet). The assessment also addresses effects on migratory non-seabird species, although it is not possible to model collision mortality for these species.

150. CRM has been undertaken for two WTG design scenarios; WTG Type 1 and WTG Type 2. WTG Type 1 is considered to be the 'worst-case' WTG option[4] because it gives the higher collision estimates (which is attributable to larger swept area than the WTG Type 2) (**Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV)**). As requested by NatureScot (**Table 10.2**), both stochastic and deterministic CRMs have also been undertaken, with the species assessments based on 'Option 2' from the stochastic outputs. All inputs used in the CRMs, including species and WTG parameters, have been agreed with NatureScot, and it has also been agreed that SNCB CRM guidance (SNCBs, 2024) should be used (with the more recent (2025) NatureScot guidance not available in time to inform this work (**Table 10.2**). The assessments presented in the following sections consider both WTG scenarios, but the assessment conclusions are based on the worst case (i.e. WTG Type 1). Full details of the CRMs (including modelling approach, WTG parameters, species parameters and avoidance rates, bird densities and flight heights, and full outputs for the stochastic and deterministic models by month and season) are presented in **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV)**.

10.8.2.5.1 Sensitivity

10.8.2.5.1.1 Kittiwake

151. Kittiwake is considered to have medium sensitivity to collision risk, taking into account the percentage of time spent flying at heights within the rotor swept area of offshore WTGs, flight agility, the percentage of time flying and the extent of nocturnal flight activity (with reference to Garthe and Hüppop, 2004; Furness and Wade, 2012; Furness et al. 2013; Wade et al. 2016).

152. Kittiwake lay two eggs and breed from the age of three years, typically living on average for 12 years (Burnell et al. 2023). Kittiwake populations have decreased in Scotland by approximately 57% since the early 2000s. Surveys managed by the RSPB in 2023 have recorded indicative increases of 8% across a number of sites in Britain in 2023 when compared against a pre-HPAI baseline (Tremlett et al. 2024a, b). Overall, kittiwake is deemed to have low recoverability.

153. Kittiwake is a qualifying interest for several SPAs with potential connectivity to the Bellrock WFDA (within the mean-max + SD foraging range), with several non-SPA colonies also within range and so the species is considered to be of international conservation value. Refer to the **Bellrock WFDA RIAA: Part 3 (Volume VI)** for details of SPAs with connectivity to the Bellrock WFDA with regards to kittiwake.

154. Kittiwake is deemed to be of medium vulnerability, low recoverability and international value. The sensitivity/value of the receptor is therefore considered to be **medium**.

[4] Given potential (but as yet unconfirmed) future developments in WTG design and availability, it is not possible to identify an actual 'most likely' design for the Bellrock WFDA at the time of writing. The two WTG design scenarios presented are considered by the Applicant to represent reasonable and creditable WTG designs which will be available in the development timeline of the Bellrock Project and therefore been used to represent the maximum extent of the WTG design envelope.

10.8.2.5.1.2 Great Black-backed Gull

155. Great black-backed gull is considered to have high sensitivity to collision risk based on available data on the percentage of time spent flying at heights within the rotor swept area of offshore WTGs, flight agility, the percentage of time flying, the extent of nocturnal flight activity and conservation importance (with reference to Garthe and Hüppop, 2004; Furness and Wade, 2012; Furness et al. 2013; Wade et al. 2016).

156. Great black-backed gull typically lay two to three eggs and breed from the age of four years, typically living on average for 12 years (Burnell et al. 2023). The species was recently assigned to the red list of UK birds of conservation concern based on a severe long-term population decline of 56% (since the first national seabird census in 1969-70); and the decline since the Seabird 2000 census is 43% (BoCC5a, Stanbury et al. 2024). In Scotland, the species' breeding distribution has contracted in western regions, but gains and losses of colonies on the east coast are approximately balanced (Balmer et al. 2013). Surveys managed by the RSPB in 2023 have indicated no clear change in counts at colonies at a UK or Scotland level in 2023 when compared against a pre-HPAI baseline (but with a high degree of uncertainty due to high inter-colony variation in trend) (Tremlett et al. 2024a) and (Tremlett et al. 2024b). Overall great black-backed gull is considered to have low recoverability.

157. As great black-backed gull is a qualifying interest for multiple SPAs potentially connected to the Bellrock WFDA in the non-breeding season, the species is considered to be of international value. Refer to the **Bellrock WFDA RIAA: Part 3 (Volume VI)** for details of SPAs with connectivity to the Bellrock WFDA with regards to great black-backed gull.

158. Great black-backed gull is deemed to be of high vulnerability, low recoverability and international value. The sensitivity/value of the receptor is therefore considered to be **high**.

10.8.2.5.1.3 Arctic Tern

159. Arctic tern is considered to have medium sensitivity to collision risk based on available data on the percentage of time spent flying at heights within the rotor swept area of offshore WTGs, flight agility, the percentage of time flying, the extent of nocturnal flight activity and conservation importance (with reference to Garthe and Hüppop, 2004; Furness and Wade, 2012; Furness et al. 2013; Wade et al. 2016).

160. Arctic tern typically lay one to two eggs and breed from the age of four years, typically living on average for 13 years (Burnell et al. 2023). The species is a red listed UK bird of conservation concern based on severe breeding population decline over 25 years (Stanbury et al. 2024). The species' Scottish breeding distribution has contracted with loss of colonies indicated to be greatest in (south) western Scotland (driven by mammalian predation) and on the North Sea coast (driven by food shortage), between the first (1968-72) and most recent British Trust for Ornithology (BTO) Atlases (Balmer et al. 2013). Overall, Arctic tern is considered to have low recoverability. Surveys managed by the RSPB in 2023 have indicated no clear change in counts at colonies at a UK or Scotland level in 2023 when compared against a pre-HPAI baseline (due to wide confidence intervals in predicted change at these scales) but counts significantly decreased for Arctic tern in England between pre- and post-HPAI (Tremlett et al. 2024a) and (Tremlett et al. 2024b). Overall Arctic tern is considered to have low recoverability.

161. As Arctic tern is a qualifying interest for multiple SPAs potentially connected to the Bellrock WFDA in the non-breeding season, the species is considered to be of international value. Refer to the **Bellrock WFDA RIAA: Part 3 (Volume VI)** for details of SPAs with connectivity to the Bellrock WFDA with regards to Arctic tern.

162. Arctic tern is deemed to be of medium vulnerability, low recoverability and international value. The sensitivity/value of the receptor is therefore considered to be **medium**.

10.8.2.5.1.4 Arctic Skua

163. Arctic skua is considered to have medium sensitivity to collision risk based on available data on the percentage of time spent flying at heights within the rotor swept area of offshore WTGs, flight agility, the percentage of time flying, the extent of nocturnal flight activity and conservation importance (with reference to Garthe and Hüppop, 2004; Furness and Wade, 2012; Furness et al. 2013; Wade et al. 2016).

164. Arctic skua typically lay two eggs and breed from the age of four years, typically living on average for 12 years (Burnell et al. 2023). The species is a red listed UK bird of conservation concern based on severe breeding population decline over 25 years (Stanbury et al. 2024), including within their core Scottish breeding areas (Perkins et al. 2018). The species' Scottish breeding distribution shows contraction from its southernmost limits (Islay and Jura), with loss of breeding birds from much of this area indicated between the first (1968-72) and most recent BTO Atlases (Balmer et al. 2013). Overall, Arctic skua is considered to have low recoverability.

165. As Arctic skua is a qualifying interest for multiple SPAs potentially connected to the Bellrock WFDA in the non-breeding season, the species is considered to be of international value. Refer to the **Bellrock WFDA RIAA: Part 3 (Volume VI)** for details of SPAs with connectivity to the Bellrock WFDA with regards to Arctic skua.

166. Arctic skua is deemed to be of medium vulnerability, low recoverability and international value. The sensitivity/value of the receptor is therefore considered to be **medium**.

10.8.2.5.1.5 Gannet

167. Gannet is considered to have medium sensitivity to collision risk based on available data on the percentage of time spent flying at heights within the rotor swept area of offshore WTGs, flight agility, the percentage of time flying, the extent of nocturnal flight activity and conservation importance (with reference to Garthe and Hüppop, 2004; Furness and Wade, 2012; Furness et al. 2013; Wade et al. 2016).

168. Gannet lay one egg per breeding season and breed from the age of five years, typically living on average for 17 years (Burnell et al. 2023). Gannet is an amber listed species of conservation concern (consistently since BoCC was first assessed in 1996) based on the UK breeding population being highly localised (50% of population located at ten or fewer sites) and comprising a significant proportion of the European population (>20%) (Stanbury et al. 2024). Surveys managed by the RSPB in 2023 have recorded indicative population decline of 16% at a UK level in 2023 when compared against the pre-HPAI baseline (and within this there were declines at the Scotland and Wales scale) (Tremlett et al. 2024a) and (Tremlett et al. 2024b). Overall, gannet is deemed to have low recoverability.

169. Gannet is a qualifying interest for several SPAs likely to be connected to the Bellrock WFDA (within the mean-max + SD foraging range), with additional non-SPA colonies also within range and so the species is considered to be of international value. Refer to the **Bellrock WFDA RIAA: Part 3 (Volume VI)** for details of SPAs with connectivity to the Bellrock WFDA with regards to gannet.

170. Gannet is deemed to be of **medium** vulnerability, low recoverability and international value. The sensitivity/value of the receptor is therefore considered to be **medium**.

10.8.2.5.1.6 Migratory Non-seabirds

171. Although migratory non-seabirds have not been significantly studied in the offshore environment, vulnerability to collision with WTGs is likely to be generally low as most migration is undertaken on a broad front per species (i.e. migrating birds would not pass along a single point, but rather across a wide area, so only a proportion of the population would be at risk at any one point) and also above rotor height of the WTGs within the Bellrock WFDA (although during poor weather flight height may be lower and closer to rotor height range). The risk to migratory species is also considered to be lower than for seabird species, as potential passages through the WFDA would occur on only one or two (depending on migration route) occasions per year, as opposed to the multiple potential exposures for seabirds that may utilise the area around the WFDA, either seasonally or year-round.

172. Recoverability of populations of migratory species may vary considerably, with smaller water species of relatively favourable conservation status carrying more ability to recover than larger species with lower reproductive rates.

173. Migratory non-seabirds comprise a wide range of species of varying conservation importance. Some species are common and widespread at a regional scale, while others represent populations associated with SPA qualifying interests. The overall value of migratory species that may pass through the area around the WFDA therefore ranges from local to international.

174. Migratory birds are deemed to be of low to medium vulnerability, low to high recoverability and local to international value. On a precautionary basis for the purpose of this assessment the sensitivity/value of the receptor is therefore considered to be **medium**.

10.8.2.5.2 Magnitude of Impact

10.8.2.5.2.1 Kittiwake

175. The estimated number of collisions for kittiwake, derived from the sCRM, per seasonal period and for the two WTG scenarios, are presented in **Table 10.28**. Highest numbers of collisions were predicted for the breeding season under both scenarios, with lower numbers of collisions predicted for the autumn and spring migration periods of the non-breeding season. Only WTG Type 1 (as the worst-case) is considered for the purpose of assessment. Full details of the input parameters and CRM outputs are presented in **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV)**.

Table 10.28: Estimated Collisions (Mean and 95% Confidence Intervals) from sCRM (Option 2) for Kittiwake at Bellrock Wind Farm Development Area for Wind Turbine Generator Types 1 and 2

Scenario	Breeding Season	Autumn Migration	Spring Migration	Total
WTG Type 1	11.74 (0 – 33.89)	4.26 (0 – 14.56)	2.87 (0 – 8.98)	18.87 (0 – 56.96)
WTG Type 2	9.40 (0 – 27.15)	3.40 (0 – 11.64)	2.30 (0 – 7.17)	15.10 (0 – 45.96)

176. Under the worst-case (WTG Type 1) the total estimated number of collisions in the breeding season is 12 (11.74) birds, in the autumn migration season four (4.26) birds and in the spring migration season three (2.87) birds. Annually, this equates to a total mortality of 19 (18.87) birds. Assuming a regional population of 829,937 (**Table 10.16**), and an average annual mortality rate of 0.157 (**Table 10.21**), this is equivalent to an annual increase in background mortality of 0.014% (refer to **Table 10.29**).

Table 10.29: Estimated Mean Numbers of Collisions (sCRM, Option 2) for Kittiwake in the Bellrock Wind Farm Development Area by Seasonal Period in Relation to Baseline Mortality, for Wind Turbine Generator Type 1 ('Worst-case')

Season	Estimated Mean Seasonal Collision Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality (%)
Breeding	11.74	686,236	107,739	0.011%
Autumn migration	4.26	829,937	130,300	0.003%
Spring migration	2.87	627,816	98,567	0.003%
Total	**18.87**	**829,937**	**130,300**	**0.015%**

Notes:
[1] Assumes an annual average mortality rate of 0.157 (**Table 10.16**).

177. A total annual mortality of 18.87 birds is equivalent to an annual mortality of 13.00 adult birds from the breeding population with connectivity to the Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.0042 (refer to Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)** for derivation of these values).

178. The impact is predicted to be of local spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, although is reversible following decommissioning, and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, the percentage point increase in the rate of baseline breeding adult mortality is below 0.02, which is the threshold for which PVA is required

under NatureScot guidance (NatureScot, 2023g). This magnitude of increase in mortality would not materially alter the background mortality of the population and would be undetectable. The magnitude of the impact is therefore considered to be **negligible.**

10.8.2.5.2.2 Great Black-backed Gull

179. The estimated number of collisions for great black-backed gull, derived from the sCRM, per seasonal period and for the two WTG scenarios, are presented in **Table 10.30**. Collisions were predicted for the spring migration period only under both scenarios, with no mortality predicted in other seasons. Only WTG Type 1 (as the worst-case) is considered for the purpose of assessment. Full details of the input parameters and CRM outputs are presented in **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV)**.

Table 10.30: Estimated Collisions (mean and 95% CIs) from sCRM (Option 2) for Great Black-backed Gull at Bellrock Wind Farm Development Area for Wind Turbine Generator Types 1 and 2

Scenario	Breeding Season	Autumn Migration	Winter	Spring Migration
WTG Type 1	0 (0 – 0)	0 (0 – 0)	0 (0 – 0)	1.14 (0 – 6.19)
WTG Type 2	0 (0 – 0)	0 (0 – 0)	0 (0 – 0)	0.88 (0 – 4.78)

180. Under the worst-case (WTG Type 1) the total estimated number of collisions in the spring migration period is one (1.14) bird. No mortality is predicted in any other season. Annually, therefore, the total mortality would also be one (1.14) bird, noting that there is no breeding season connectivity between the Bellrock WFDA and great black-backed gull breeding colonies. If it was assumed, on a precautionary basis, that all birds present at the Bellrock WFDA are breeding adults, an annual mortality of 1.14 birds would be equivalent to a percentage point increase in the rate of baseline mortality of 0.001, assuming a regional population of 91,399 (**Table 10.16**). This is substantially below a percentage point change in baseline breeding adult mortality of 0.02, which is the threshold for which PVA is required under NatureScot guidance (NatureScot, 2023g). Such a change would not be detectable at a population level.

181. The impact is predicted to be of local spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, although is reversible following decommissioning and is therefore considered to be of long-term duration. However, the predicted level of mortality (i.e. one bird per annum as a worst-case) is considered to be inconsequential in the context of background mortality. The magnitude of the impact is therefore considered to be **negligible.**

10.8.2.5.2.3 Arctic Tern

182. The estimated number of collisions for Arctic tern, derived from the sCRM, per seasonal period and for the two WTG scenarios, are presented in **Table 10.31**. Collisions were predicted for the breeding season only under both scenarios, with no mortality predicted in other seasons. Only WTG Type 1 (as the worst-case) is considered for the purpose of assessment. Full details of the input parameters and CRM outputs are presented in **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV)**.

Table 10.31: Estimated Collisions (mean and 95% CIs) from sCRM (Option 2) for Arctic Tern at Bellrock Wind Farm Development Area for Wind Turbine Generator Types 1 and 2

Scenario	Breeding Season	Autumn Migration	Winter	Spring Migration
WTG Type 1	0.35 (0 – 2.22)	0	0	0
WTG Type 2	0.29 (0 – 1.80)	0	0	0

183. Under the worst-case (WTG Type 1) the total estimated number of collisions in the breeding season is substantially below one (0.35) bird. No mortality is predicted in any other season. Annually, therefore, the total mortality would also be less than one (0.35) bird. It is noted that there is no breeding season connectivity between the Bellrock WFDA and Arctic tern breeding colonies, and birds were recorded during the DAS primarily in July and August. Therefore, it is most likely that these represent non-breeding or early autumn passage birds. If it was assumed, on a precautionary basis, that all birds present at the Bellrock WFDA are breeding adults, an annual mortality of 0.35 birds would be equivalent to a percentage point increase in the rate of baseline mortality of 0.0002, assuming a regional population of 163,930 (**Table 10.16**). This is substantially below a percentage point change in baseline breeding adult mortality of 0.02, which is the threshold for which PVA is required under NatureScot guidance (NatureScot, 2023g). Such a change would not be detectable at a population level.

184. The impact is predicted to be of local spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, although is reversible following decommissioning and is therefore, considered to be of long-term duration. However, the predicted level of mortality (i.e. substantially less than one bird per annum as a worst-case) is considered to be inconsequential in the context of background mortality. The magnitude of the impact is, therefore, considered to be **negligible.**

10.8.2.5.2.4 Arctic Skua

185. The estimated number of collisions for Arctic skua, derived from the sCRM, per seasonal period and for the two WTG scenarios, are presented in **Table 10.32**. Collisions were predicted for the breeding season only under both scenarios, with no mortality predicted in other seasons. Only WTG Type 1 (as the worst-case) is considered for the purpose of assessment. Full details of the input parameters and CRM outputs are presented in **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV)**.

Table 10.32: Estimated Collisions (mean and 95% CIs) from sCRM (Option 2) for Arctic Skua at Bellrock Wind Farm Development Area for Wind Turbine Generator Types 1 and 2

Scenario	Breeding Season	Autumn Migration	Winter	Spring Migration
WTG Type 1	0.08 (0 – 0.55)	0	0	0
WTG Type 2	0.07 (0 – 0.45)	0	0	0

186. Under the worst-case (WTG Type 1) the total estimated number of collisions in the breeding season is substantially below one (0.08) bird. No mortality is predicted in any other season. Annually, therefore, the total mortality would also be less than one (0.08) bird. It is noted that there is no breeding season connectivity between the Bellrock WFDA and Arctic skua breeding colonies, and only a single bird was recorded during the DAS, in June 2022. Therefore, it is most likely that this record was a non-breeding or late spring passage bird. If it was assumed, on a precautionary basis, that all birds present at the Bellrock WFDA are breeding adults, an annual mortality of 0.08 birds would be equivalent to a percentage point increase in the rate of baseline mortality of 0.001, assuming a regional population of 6,427 (**Table 10.16**). This is substantially below a percentage point change in baseline breeding adult mortality of 0.02, which is the threshold for which PVA is required under NatureScot guidance (NatureScot, 2023g). Such a change would not be detectable at a population level.

187. The impact is predicted to be of local spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, although is reversible following decommissioning and is therefore considered to be of long-term duration. However, the predicted level of mortality (i.e. substantially less than one bird per annum as a worst-case) is considered to be inconsequential in the context of background mortality. The magnitude of the impact is therefore considered to be **negligible.**

10.8.2.5.2.5 Gannet

188. The estimated number of collisions for gannet, derived from the sCRM, per seasonal period and for the two WTG scenarios, are presented in **Table 10.33**. Highest numbers of collisions were predicted for the breeding season under both scenarios, with lower numbers of collisions predicted for the autumn and spring migration periods of the non-breeding season. Only WTG Type 1 (as the worst-case) is considered for the purpose of assessment. Full details of the input parameters and CRM outputs are presented in **Appendix 10.2: Offshore Ornithology Collision Modelling Technical Report (Volume IV)**.

Table 10.33: Estimated Collisions (mean and 95% CIs) from sCRM (Option 2) for Gannet at Bellrock Wind Farm Development Area for Wind Turbine Generator Types 1 and 2

Scenario	Breeding Season	Autumn Migration	Spring Migration	Total
WTG Type 1	14.77 (0 – 45.34)	2.46 (0 – 10.68)	0.60 (0 – 2.44)	17.83 (0 – 58.46)
WTG Type 2	11.37 (0 – 34.78)	1.89 (0 – 8.19)	0.46 (0 – 1.87)	13.73 (0 – 44.83)

189. Under the worst-case (WTG Type 1) the total estimated number of collisions in the breeding season is 15 (14.77) birds, in the autumn migration season two (2.46) birds and in the spring migration season one (0.60) bird. Annually, this equates to a total mortality of 18 (17.83) birds. Assuming a regional population of 690,990 (**Table 10.16**), and an average annual mortality rate of 0.187 (**Table 10.21**) this is equivalent to an annual increase in background mortality of 0.014% (refer to **Table 10.34**).

Table 10.34: Estimated Mean Numbers of Collisions (sCRM, Option 2) for Gannet in the Bellrock Wind Farm Development Area by Seasonal Period in Relation to Baseline Mortality, for Wind Turbine Generator Type 1 (Worst-case)

Season	Estimated Mean Seasonal Collision Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality (%)
Breeding	14.77	690,990	129,215	0.011
Autumn migration	2.46	456,298	85,328	0.003
Spring migration	0.60	248,385	46,448	0.001
Total	**17.83**	**690,990**	**129,215**	**0.014**
Notes: [1] Assumes an annual average mortality rate of 0.187 (**Table 10.21**).				

190. A total annual mortality of 17.83 birds is equivalent to an annual mortality of 14.64 adult birds from the breeding population with connectivity to Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.0039 (refer to Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)** for derivation of these values).

191. The impact is predicted to be of local spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, although is reversible following decommissioning and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, the percentage point increase in the rate of baseline breeding adult mortality is below 0.02, which is the threshold for which PVA is required under NatureScot guidance (NatureScot, 2023g). This magnitude of increase in mortality would not materially alter the background mortality of the population and would be undetectable. The magnitude of the impact is therefore considered to be **negligible.**

10.8.2.5.2.6 Migratory Non-seabirds

192. It is recognised that baseline occurrence of migratory birds within the Bellrock WFDA may not be adequately characterised by the DAS carried out in the OASA. Migratory species may fly mainly at night (when no DAS is carried out) or in pulse movements which could be missed by the monthly DAS. Therefore, collision risk to migratory birds cannot be assessed using the same methodology and assumptions as applied for regularly occurring seabird species (as above). The potential effect on migratory birds has been assessed using a qualitative approach based on the strategic assessment of collision risk of Scottish OWFs to migrating birds (WWT, 2014) and Woodward et al. (2023) which is the first work package of the in-development migratory collision risk model (mCRM) tool.

193. The second work package of the in-development migratory collision risk model (mCRM) tool is the development of a sCRM tool for migratory bird species; whilst this model now exists in its Beta version, it has not been approved for use by NatureScot or incorporated into guidance at the time of the present assessment. In the Scoping Report (Bellrock WFDA Scoping Report; paragraph:

812) it was proposed that the mCRM tool would be used, subject to review and availability in sufficient time within the EIA programme. Since the tool has not yet been endorsed for use by NatureScot, the approach to migrating birds' collision risk assessment has relied on the existing report on strategic assessment of collision risk of Scottish OWFs to migrating birds (WWT, 2014) and Woodward et al. (2023).

194. Woodward et al. (2023) provides a review of available information on migratory birds in Scottish waters and the potential for collision risk. Key information included are population estimates, migratory routes, timing of migration, migratory flight heights, migratory flight speeds and migratory avoidance rates and behaviour. Woodward et al. (2023) compiles this information for 70 species or sub-species (including for different flyway populations in two cases where that is relevant), all of which are non-seabird qualifying features of one or more SPAs, including swans, geese, ducks, waders, raptors and other non-passerines. Key information for species determined to have overlap between their migration corridor and the Bellrock WFDA on the basis of the information provided in Woodward et al. (2023) is summarised in **Table 10.35**, along with a summary conclusion on the likely magnitude of impact.

195. The last data column in **Table 10.35** presents the percentage of the total population that could potentially be susceptible to collision risk on the basis of multiplying collision risk height (CRH) and avoidance rate (AR) for each species. This represents the percentage of birds at risk of collision if the entire migratory population passed through the Bellrock WFDA, which is highly unrealistic in all cases. WWT (2014) gives estimates of the migratory front for east coast populations for 38 of the 72 species, subspecies or flyway populations listed in **Table 10.35** (noting that, for a given species, the estimates in WWT (2014) for migratory front widths are smaller than for the migratory corridor widths given in Woodward et al. (2023)). The maximum width of the Bellrock WFDA is 36 km, whilst the average width as calculated for use in collision risk modelling is 19 km (**Appendix 10.2: Offshore Ornithology Collision Risk Modelling Technical Report (Volume IV)**). These values represent 2% to 3% of the widest migratory front and 15% to 28% of the narrowest migratory front given in **Table 10.35**. Therefore, for the majority of species, when the proportion of the population that is estimated to fly through the Bellrock WFDA is taken into account, the percentage of the population estimated to be potentially at risk of collision is likely to be one or two orders of magnitude less than the values given in **Table 10.35**. These estimates would be further reduced if the 'width' of the rotor swept area (as opposed to the actual WFDA) relative to the migratory front was to be considered.

196. The WWT (2014) strategic assessment of collision risk to migratory birds used an indicative threshold of 1% of the passage population being impacted to inform which species were of concern. When assuming that all birds will pass through the Bellrock WFDA, the percentage of the population estimated to be at potential risk of collision (as based solely on the CRH and AR values) is below this threshold for the majority of the 70 species (or subspecies) in **Table 10.35**. For 18 species, the estimated percentage at potential risk of collision slightly exceeds this threshold. However, as set out above, the percentages of the migratory populations identified in **Table 10.35** which are potentially at risk of collision from the Bellrock WFDA alone will be very small (representing a fraction of a percent) when account is made for the small proportion of the population that is expected to pass through the Bellrock WFDA (because the Bellrock WFDA represents a small proportion of the migratory front for these species).

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Table 10.35: Recommended Values for the Collision Risk Height and Avoidance Rate for the Migratory Non-Seabird Species Considered in Woodward et al. (2023), Together With the Percentage of Each Population at Potential Risk of Collision as Derived from the CRH and AR Values. Where Available, the Estimated Migratory Front Width is Also Shown.

Species	Connectivity of the Main Migratory Route to the Bellrock WFDA	Migration Front Width (km) (WWT, 2014)	Recommended % at CRH (Woodward et al. 2023)	Recommended AR (Woodward et al. 2023)	Percentage of Population at Risk of Collision [a]	Summary and Conclusion
'East Atlantic' light-bellied brent goose	Yes	671.0	50	0.9998	0.01%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
'Nearctic' Light–bellied brent goose	No	458.2	50	0.9998	Not applicable	No connectivity and therefore, **no change**.
Dark-bellied brent goose	No	-	50	0.9998	Not applicable	No connectivity and therefore, **no change**.
'Svalbard' barnacle goose	Yes	297.6	100	0.9998	0.02%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
'Greenland' barnacle goose	No	513.7	100	0.9998	Not applicable	No connectivity and therefore, **no change**.
'Icelandic' greylag goose	No	814.2	50	0.9998	Not applicable	No connectivity and therefore, **no change**.
Taiga bean goose	Yes	196.5	100	0.9998	0.02%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Pink-footed goose	Yes	620.6	50	0.9999	0.00%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
'Greenland' white-fronted goose	No	482.7	100	0.9998	Not applicable	No connectivity and therefore, **no change**.

Species	Connectivity of the Main Migratory Route to the Bellrock WFDA	Migration Front Width (km) (WWT, 2014)	Recommended % at CRH (Woodward et al. 2023)	Recommended AR (Woodward et al. 2023)	Percentage of Population at Risk of Collision [a]	Summary and Conclusion
'European' white-fronted goose	No	-	100	0.9998	Not applicable	No connectivity and therefore, **no change**.
Bewick's swan	No	-	50	0.9885	Not applicable	No connectivity and therefore, **no change**.
Whooper swan	Yes	622.0	50	0.9874	0.63%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Shelduck	Yes	-	50	0.9851	0.75%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Shoveler	Yes	-	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Gadwall	Yes	-	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Wigeon	Yes	1,140	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Mallard	Yes	-	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.

Species	Connectivity of the Main Migratory Route to the Bellrock WFDA	Migration Front Width (km) (WWT, 2014)	Recommended % at CRH (Woodward et al. 2023)	Recommended AR (Woodward et al. 2023)	Percentage of Population at Risk of Collision [a]	Summary and Conclusion
Pintail	Yes	1,139.2	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Teal	Yes	1,140	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Pochard	Yes	445.4	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Tufted duck	Yes	1,134.6	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Scaup	Yes	1,101.1	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Eider	Yes	-	25	0.9851	0.37%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Velvet scoter	Yes	533.9	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Common scoter	Yes	1,140	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.

Species	Connectivity of the Main Migratory Route to the Bellrock WFDA	Migration Front Width (km) (WWT, 2014)	Recommended % at CRH (Woodward et al. 2023)	Recommended AR (Woodward et al. 2023)	Percentage of Population at Risk of Collision [a]	Summary and Conclusion
Long-tailed duck	Yes	1,104.1	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Goldeneye	Yes	-	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Goosander	Yes	-	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Red-breasted merganser	Yes	-	100	0.9851	1.49%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Nightjar	Yes	-	100	0.9954	0.46%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Corncrake	Yes	210.0	100	0.9875	1.25%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Spotted Crake	Yes	-	100	0.9875	1.25%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Great crested grebe	Yes	-	100	0.9954	0.46%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.

Species	Connectivity of the Main Migratory Route to the Bellrock WFDA	Migration Front Width (km) (WWT, 2014)	Recommended % at CRH (Woodward et al. 2023)	Recommended AR (Woodward et al. 2023)	Percentage of Population at Risk of Collision [a]	Summary and Conclusion
Slavonian grebe	Yes	-	100	0.9954	0.46%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Stone-curlew	No	-	100	0.9996	Not applicable	No connectivity and therefore, **no change**.
Oystercatcher	Yes	1,138.6	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Avocet	No	-	100	0.9996	Not applicable	No connectivity and therefore, **no change**.
Lapwing	Yes	-	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Golden plover	Yes	1,124.2	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Grey plover	Yes	531.0	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Ringed plover	Yes	-	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Dotterel	Yes	533.0	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.

Species	Connectivity of the Main Migratory Route to the Bellrock WFDA	Migration Front Width (km) (WWT, 2014)	Recommended % at CRH (Woodward et al. 2023)	Recommended AR (Woodward et al. 2023)	Percentage of Population at Risk of Collision [a]	Summary and Conclusion
Whimbrel	Yes	620	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Curlew	Yes	520	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Bar-tailed godwit	Yes	520	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Black-tailed godwit	No	-	100	0.9996	Not applicable	For the *limosa* population, there is no connectivity and therefore, **no change**.
	Yes	620	100	0.9996	0.04%	For the *islandica* population, migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Turnstone	Yes	1,165.8	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Knot	Yes	-	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Ruff	Yes	254.3	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.

Species	Connectivity of the Main Migratory Route to the Bellrock WFDA	Migration Front Width (km) (WWT, 2014)	Recommended % at CRH (Woodward et al. 2023)	Recommended AR (Woodward et al. 2023)	Percentage of Population at Risk of Collision [a]	Summary and Conclusion
Sanderling	Yes	1,158.0	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Dunlin	Yes	1,140	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Purple sandpiper	Yes	-	100	0.9996	0.10%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Snipe	Yes	1,165.8	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Red-necked phalarope	No	479.5	100	0.9996	Not applicable	No connectivity and therefore, **no change**.
Redshank	Yes	620	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Wood sandpiper	Yes	219.1	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Greenshank	Yes	441.8	100	0.9996	0.04%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.

Species	Connectivity of the Main Migratory Route to the Bellrock WFDA	Migration Front Width (km) (WWT, 2014)	Recommended % at CRH (Woodward et al. 2023)	Recommended AR (Woodward et al. 2023)	Percentage of Population at Risk of Collision [a]	Summary and Conclusion
Red-throated diver	Yes		25	0.9954	0.12%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Black-throated diver	Yes	-	25	0.9954	0.12%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Great Northern diver	Yes	-	25	0.9954	0.12%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Bittern	Yes	-	100	0.9928	0.72%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Osprey	Yes	127.3	50	0.9957	0.21%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Honey buzzard	No	-	50	0.9957	Not applicable	No connectivity and therefore, **no change**.
Marsh harrier	Yes	-	50	0.9957	0.21%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Hen harrier	Yes	872.1	100	0.9957	0.43%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Montagu's harrier	No	-	100	0.9957	Not applicable	No connectivity and therefore, **no change**.

Species	Connectivity of the Main Migratory Route to the Bellrock WFDA	Migration Front Width (km) (WWT, 2014)	Recommended % at CRH (Woodward et al. 2023)	Recommended AR (Woodward et al. 2023)	Percentage of Population at Risk of Collision [a]	Summary and Conclusion
White-tailed eagle	No	-	100	0.9872	Not applicable	No connectivity and therefore, **no change**.
Short-eared owl	Yes	-	100	0.9957	0.43%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Merlin	Yes	-	100	0.9891	1.09%	Migratory route and flight heights indicate potential risk, but high avoidance rate. Therefore, magnitude of impact considered to be **low**.
Sandwich tern	Yes	-	13[b]	0.9902	0.13%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.
Cormorant	Yes	-	100	0.9923[c]	0.77%	Migratory route and flight heights indicate potential risk, but very high avoidance rate. Therefore, magnitude of impact considered to be **negligible**.

Notes:

[a] Calculated from the Woodward et al. (2023) values for the percentage at CRH and the avoidance rate

[b] CRH for Sandwich tern based on Fijn & Collier 2022 (13% of birds observed flying at altitudes higher than 20 m above sea level).

[c] AR after Joint advice note from the SNCBs regarding bird collision risk modelling for offshore wind developments. SNCBs, 2024 (gannet rate used for cormorant due to absence of published data).

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197. For all species, the impact is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. Collision impact would affect the receptor directly. 58 species have potential connectivity to the Bellrock WFDA on migration and while 18 of these reach the indicative threshold of 1% of the passage population being at potential risk of collision, as suggested by Woodward (2023), the actual potential effect would be (at least) an order of magnitude less in each case. Therefore, on a precautionary basis the expected worst-case magnitude of impact is deemed to be **low**.

10.8.2.5.3 Significance of Effect

10.8.2.5.3.1 Seabird Species

198. For kittiwake, Arctic tern, Arctic skua and gannet sensitivity/value is **medium** and the magnitude of impact is **negligible**. The effect is of **negligible** significance, which is **not significant** in EIA terms.

199. For great black-backed gull sensitivity/value is **high** and the magnitude of impact is **negligible**. The effect is of **minor adverse** significance, which is **not significant** in EIA terms.

10.8.2.5.3.2 Migratory non-seabirds

200. For migratory non-seabird species considered in the assessment sensitivity/value is **medium** and the magnitude of impact is **no change, negligible** or **low**. The effect is therefore **no effect**, **negligible** or **minor adverse** significance respectively, all of which are **not significant** in EIA terms.

10.8.2.6 Impact O6: Combined Collision and Displacement

201. As set out in **Section 10.8.2.3** (Impact O3: Disturbance and Displacement from the Physical Presence of WTGs) and **10.8.2.5** (Impact O5: Collision with WTGs), two seabird species are considered sensitive to both displacement and collision impacts during the O&M phase of the Bellrock Wind Farm Infrastructure, kittiwake and gannet. The assessment has therefore considered the potential combined mortality for these species as a result of these two impact pathways. It is noted that this approach could result in some double counting of the potential effect, as birds that are displaced from the Bellrock WFDA cannot be subject to collision, and conversely any bird that has collided with a WTG cannot also be affected by displacement. The assessment is therefore considered precautionary and likely to overestimate the actual effect.

10.8.2.6.1 Sensitivity

202. Both kittiwake and gannet have been assessed as having **medium** sensitivity to displacement (**Section 10.8.2.3.1**) and **medium** sensitivity to collision risk (**Section 10.8.2.5.1**). Overall, therefore, both species are assumed to have **medium** sensitivity to the combined effects of displacement and collision.

10.8.2.6.2 Magnitude

10.8.2.6.2.1 Kittiwake

203. The combined displacement and collision mortality estimate for kittiwake is presented in **Table 10.36**. This is based on the displacement estimates presented in **Section 10.8.2.3.2.1** (assuming 30% displacement and 1 – 3% mortality of displaced birds), and mean collision mortality presented in **Section 10.8.2.5.2.1** (assuming the worst-case WTG Type 1).

Table 10.36: Estimated Seasonal Kittiwake Mortality for Combined Displacement and Collision Impacts at Bellrock Wind Farm Development Area.

Impact	Breeding Season	Autumn Migration	Spring Migration	Total
Displacement	0.9 – 2.8	0.3 – 0.8	0.3 – 0.8	1.5 – 4.4
Collision	11.74	4.26	2.87	18.87
Combined	12.64 – 14.54	4.56 – 5.06	3.17 – 3.67	20.37 – 23.27

204. The total estimated annual mortality is 20.37 to 23.27 birds. Assuming a regional population of 829,937 (**Table 10.16**), and an average annual mortality rate of 0.157 (**Table 10.21**), this is equivalent to an annual increase in background mortality of 0.016% to 0.018% (refer to **Table 10.37**).

Table 10.37: Estimated Kittiwake Mortality for Combined Displacement and Collision Impacts at the Bellrock Wind Farm Development Area by Seasonal Period in Relation to Baseline Mortality.

Season	Estimated Mean Seasonal Mortality	Regional Baseline Population	Annual Regional Baseline Mortality [a]	Increase in Baseline Mortality (%)
Breeding	12.64 – 14.54	687,402	107,922	0.012 – 0.013
Autumn migration	4.56 – 5.06	829,937	130,300	0.003 – 0.004
Spring migration	3.17 – 3.67	627,816	98,567	0.003 – 0.004
Total	**20.37 – 23.27**	**829,937**	**130,300**	**0.016 – 0.018**

Notes:

[a] Assumes an annual average mortality rate of 0.157 (**Table 10.21**).

205. A total annual mortality of 20.37 to 23.27 birds is equivalent to an annual mortality of 14.03 to 16.08 adult birds from the breeding population with connectivity to Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.0045 to 0.0051 (refer to Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)** for derivation of these values).

206. The impact is predicted to be of local spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, although is reversible following decommissioning and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, the percentage point increase in the rate of baseline breeding adult mortality is below 0.02, which is the threshold for which PVA is required under NatureScot guidance (NatureScot, 2023g). This magnitude of increase in mortality would

not materially alter the background mortality of the population and would be undetectable. The magnitude of the impact is therefore considered to be **negligible.**

10.8.2.6.2.2 Gannet

207. The combined displacement and collision mortality estimate for gannet is presented in **Table 10.38**. This is based on the displacement estimates presented in **Section 10.8.2.3.2.5** (assuming 70% displacement and 1 – 3% mortality of displaced birds), and mean collision mortality presented in **Section 10.8.2.5.2.5** (assuming the worst-case WTG Type 1).

Table 10.38: Estimated Seasonal Gannet Mortality for Combined Displacement and Collision Impacts at Bellrock Wind Farm Development Area.

Impact	Breeding Season	Autumn Migration	Spring Migration	Total
Displacement	1.8 – -5.4	1.6 – 4.7	1.1 – 3.3	4.5 – 13.4
Collision	14.77	2.46	0.6	17.83
Combined	16.57 – 20.17	4.06 – 7.16	1.7 – 3.9	22.33 – 31.23

208. The total estimated annual mortality is 22.33 – 31.23 birds. Assuming a regional population of 690,990 (**Table 10.16**), and an average annual mortality rate of 0.187 (**Table 10.21**), this is equivalent to an annual increase in background mortality of 0.017% to 0.024% (refer to **Table 10.39**).

Table 10.39: Estimated Seasonal Gannet Mortality for Combined Displacement and Collision Impacts at Bellrock Wind Farm Development Area.

Season	Estimated Mean Seasonal Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[a]	Increase in Baseline Mortality (%)
Breeding	16.57 – 20.17	690,990	129,215	0.013 – 0.016
Autumn migration	4.06 – 7.16	456,298	85,328	0.005 – 0.008
Spring migration	1.7 – 3.9	248,385	46,448	0.004 – 0.008
Total	**22.33 – 31.23**	**690,990**	**129,215**	**0.017 – 0.024**

Notes:

[a] Assumes an annual average mortality rate of 0.187 (**Table 10.21**).

209. A total annual mortality of 22.33 to 31.23 birds is equivalent to an annual mortality of 17.79 to 24.04 adult birds from the breeding population with connectivity to Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population

of 0.0047 to 0.0063 (refer to Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)** for derivation of these values).

210. The impact is predicted to be of local spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, although is reversible following decommissioning and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, the percentage point increase in the rate of baseline breeding adult mortality is below 0.02, which is the threshold for which PVA is required under NatureScot guidance (NatureScot, 2023g). This magnitude of increase in mortality would not materially alter the background mortality of the population and would be undetectable. The magnitude of the impact is therefore considered to be **negligible**.

10.8.2.6.3 Significance of Effect

10.8.2.6.3.1 Kittiwake

211. Overall, it is predicted that sensitivity/value of kittiwake is **medium,** and the magnitude of impact is **negligible**. The effect is therefore of **negligible** significance, which is **not significant** in EIA terms.

10.8.2.6.3.2 Gannet

212. Overall, it is predicted that sensitivity/value of gannet is **medium,** and the magnitude of impact is **negligible**. The effect is therefore of **negligible** significance, which is **not significant** in EIA terms.

10.8.2.7 Impact O7: Secondary Entanglement with Subsea Infrastructure

213. There is the risk that diving seabird species could become entangled with subsea infrastructure, specifically debris that may become attached to mooring lines of FSSs or dynamic sections of the IACs. It is considered very unlikely that seabirds would become entangled with the mooring lines, dynamic sections of the IACs and other subsea structures directly; however, there is the risk of secondary entanglement if, for example, fishing gear were to become caught on below water structures associated with the Bellrock WFDA.

10.8.2.7.1 Sensitivity

214. It is considered that diving seabird species occurring within the Bellrock WFDA could be vulnerable to entanglement, i.e. guillemot, razorbill and puffin. Other surface-feeding species are unlikely to be vulnerable to this impact pathway and are therefore screened out from the assessment.

215. Given the known vulnerability of these species to entanglement (e.g. as a result of bycatch), and likely fatality of any birds caught, the sensitivity of all four species is considered to be **high**.

10.8.2.7.2 Magnitude of Impact

216. There is little evidence that seabirds are subject to regular secondary entanglement (SEER, 2022). If secondary entanglement was a high risk to seabirds, it is expected that it would have been detected and reported in relation to other offshore deployments including oil and gas platforms (Benjamins et al. 2014). Regular inspection and monitoring of mooring lines and other subsea structures would also be undertaken during the O&M phase, as part of which any debris likely to cause entanglement would be removed.

217. The impact is predicted to be of local spatial extent, long-term duration, continuous and high reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore considered to be **negligible**.

10.8.2.7.3 Significance of Effect

218. Overall, for the three species considered vulnerable to secondary entanglement (guillemot, razorbill and puffin) it is predicted that sensitivity is **high,** and the magnitude of impact is **negligible**. The effect (worst-case) is therefore, of **minor adverse** significance, which is **not significant** in EIA terms.

10.8.2.8 Impact O8: Artificial Lighting

219. There is the potential that seabird species could be affected by artificial lighting during the O&M phase of the development. Navigation and aviation lighting on Wind Farm Infrastructure within the Bellrock WFDA and service vessels at night or periods of poor visibility may potentially be a source of attraction (phototaxis), or displacement, for birds.

220. A review of potential lighting effects is presented for the construction phase in **Section 10.8.1.3**. The mechanisms and receptors during the O&M phase would be broadly similar, and therefore this information is not repeated here. As for the construction phase, and as set out in the HRA screening report for the Bellrock WFDA (**Bellrock WFDA RIAA: Part 1, Appendix B**), evidence from the DAS and tracking data indicates that sensitive seabird species (Manx shearwater, Leach's storm petrel and European storm petrel) do not regularly occur at the Bellrock WFDA. It is also considered that nocturnal migrating birds are unlikely to be affected due to the low intensity of lights within the Bellrock WFDA. It is noted that effects on Manx shearwaters are considered most likely from bright lights (e.g. from a lighthouse) but that the effects of lights in the red spectrum appear to have a limited effect (e.g. Syposz, 2021). A LMP will be submitted post consent. An **Outline LMP** is provided in **Volume V**. Lighting used on the Bellrock Wind Farm Infrastructure will meet the legal marine navigation and aviation obligations, however, will be minimised as far as possible beyond that to reduce potential effects to sensitive seabirds.

10.8.2.8.1 Sensitivity

221. As species sensitive to lighting effects are unlikely to occur at the Bellrock WFDA, the sensitivity/value is therefore considered to be **negligible** for all receptors.

10.8.2.8.2 Magnitude of Impact

222. As no species sensitive to artificial lighting are predicted to regularly occur at the Bellrock WFDA, the magnitude of impact is considered to be **negligible** for all receptors**.**

10.8.2.8.3 Significance of Effect

223. Overall, it is predicted that sensitivity/value is **negligible,** and the magnitude of impact is **negligible** for all receptors. A **negligible adverse** effect is therefore predicted, which is **not significant** in EIA terms.

10.8.3 Decommissioning

224. Any effects generated during the decommissioning phase of the Bellrock Wind Farm Infrastructure would be expected to be similar, or of reduced magnitude, to those generated during the construction phase, as certain activities such as piling would not be required. Decommissioning would generally involve a reverse of the construction phase through the removal of some structures and materials installed.

225. Potential impacts predicted during the decommissioning phase included those associated with disturbance and displacement and indirect effects on birds through effects on habitats and prey species.

226. It is anticipated that any future activities would be programmed in close consultation with the relevant statutory marine and nature conservation bodies, to allow any future guidance and best practice to be incorporated to minimise any potential impacts.

10.8.3.1 Impact D1: Temporary Disturbance and Displacement

227. Disturbance and displacement would be likely to occur due to the presence of working vessels and crews, and the movement, noise and light associated with these. Such activities have already been assessed for relevant bird species in the construction phase assessment (**Section 10.8.1.1**) and have been found to be of negligible impact magnitude.

228. Any impacts generated during the decommissioning phase of the Bellrock Wind Farm Infrastructure would be expected to be similar, but likely of reduced magnitude compared to those generated during the construction phase; therefore, the impact magnitude is also predicted to be negligible. For each of the four species assessed (guillemot, razorbill, puffin and gannet) sensitivity was assessed as **medium** and the magnitude of impact **negligible**. The effect is therefore of **negligible** significance, which is **not significant i**n EIA terms.

10.8.3.2 Impact D2: Indirect Impacts

229. Indirect effects such as displacement of seabird prey species would be likely to occur as structures are removed. Such activities have already been assessed for relevant bird species in the construction section above (**Section 10.8.1.2**) and have been found to be of negligible magnitude.

230. Any impacts generated during the decommissioning phase of the Bellrock Wind Farm Infrastructure would be expected to be similar, but likely of reduced magnitude compared to those generated during the construction phase, therefore, the impact magnitude is predicted to be **low**. Affected species are considered to be of **medium** sensitivity to indirect impacts, and so an effect of **minor adverse** significance is predicted, which is **not significant** in EIA terms.

10.8.3.3 Impact D3: Artificial Lighting

231. Lighting during decommissioning has the potential to affect sensitive species as a result of phototaxis or displacement. Such impacts have already been assessed for relevant bird species in the construction phase assessment (**Section 10.8.1.3**) and have been found to be of negligible impact magnitude.

232. Any impacts generated during the decommissioning phase of the Bellrock Wind Farm Infrastructure would be expected to be similar, but likely of reduced magnitude compared to those generated

during the construction phase; therefore, the impact magnitude is also predicted to be negligible. It is noted that species considered particularly sensitive to lighting impacts (Manx shearwater, Leach's storm petrel and European storm petrel) have not been found to occur regularly within the WFDA, and no breeding season connectivity between the Bellrock WFDA and SPA colonies for these species has been identified. Sensitivity has therefore been assessed as **negligible** and the magnitude of impact **negligible**. The effect is therefore of **negligible** significance, which is **not significant i**n EIA terms.

10.9 Cumulative Effects Assessment

233. The CEA follows the methodology set out in **Chapter 5: EIA Methodology (Volume II)** and summarised in **Section 10.4.2**.

10.9.1 Screening of Potential Cumulative Impacts

234. Potential impacts from the Bellrock WFDA alone assessment are brought forward into the CEA. Some potential impacts considered for the Bellrock WFDA alone assessment may be specific to a particular phase of development (e.g. construction, O&M, or decommissioning). The potential for cumulative effects with other plans or projects requires spatial and/or temporal overlap with the Bellrock Wind Farm Infrastructure during the relevant phases of development. Therefore, impacts associated with a certain phase may be screened out from further consideration where no projects or plans have been identified that have the potential for cumulative effects during the same temporal period and/or across the same spatial extent. All impacts considered in the Bellrock Wind Farm Infrastructure alone assessment (**Section 10.8)** were initially brought forward for CEA impact pathway screening (**Table 10.40**). Impact screening considered the Zone of Influence of the impacts and the plans and projects identified in **Table 10.41.** Impacts with no rationale for cumulative effects i.e. those assessed as no change or where impacts were highly spatially and/or temporally constrained, and therefore would not contribute to a cumulative effect, were screened out.

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Table 10.40: Potential Cumulative Impacts (Offshore Ornithology Impact Screening)

Potential Impact	Bellrock Wind Farm Infrastructure-alone Residual Effect	Potential for Cumulative Effects	Rationale
Construction Phase			
Impact C1: Temporary Disturbance and Displacement	Negligible	Yes	The likelihood that there would be a cumulative impact is **low** because the contribution from the Bellrock Wind Farm Infrastructure would be small and dependent on a temporal and spatial co-incidence of disturbance/displacement from other plans or projects. However, potential cumulative effects may occur with the Bellrock OfTDA given the proximity to the Bellrock WFDA and expected overlap of disturbing activities.
Impact C2: Indirect Effects through Impacts to Habitats and Prey Species	Minor adverse	Yes	The likelihood that there would be a cumulative impact is **low** because the contribution from the Bellrock Wind Farm Infrastructure would be small and dependent on a temporal and spatial co-incidence of indirect effects from other plans or projects. Potential cumulative effects may occur with the Bellrock OfTDA, as the scale of effect for the Bellrock Wind Farm Infrastructure alone exceeds a negligible level, and there is some risk of overlap with activities for the two projects.
Impact C3: Artificial Lighting	Negligible	No	The likelihood that there would be a cumulative impact is **low** because the contribution from the Bellrock Wind Farm Infrastructure would be small and dependent on a temporal and spatial co-incidence of lighting impacts from other plans or projects. Although some overlap with the Bellrock OfTDA is expected to occur, the negligible and localised effect of the Bellrock Wind Farm Infrastructure means that a contribution to any cumulative effect can be ruled out.
Impact C4: Indirect Impacts from UXO Clearance	Negligible	No	The likelihood that there would be a cumulative impact is **low** because the contribution from the Bellrock Wind Farm Infrastructure would be small and dependent on a temporal and spatial co-incidence of indirect impacts from UXO clearance from other plans or projects. Although some overlap with the Bellrock OfTDA is expected to occur, the negligible and localised effect of the Bellrock Wind Farm Infrastructure means that a contribution to any cumulative effect can be ruled out.

Potential Impact	Bellrock Wind Farm Infrastructure-alone Residual Effect	Potential for Cumulative Effects	Rationale
Operation and Maintenance Phase			
Impact O1: Temporary Disturbance and Displacement	Negligible	No	The likelihood that there would be a cumulative impact is **low** because the contribution from the Bellrock Wind Farm Infrastructure would be small and dependent on a temporal and spatial co-incidence of disturbance/displacement from other plans or projects. Although this could be the case in respect of the Bellrock OfTDA, the scale of effect and extent of any overlap is likely to be too small to result in any meaningful cumulative effect.
Impact O2: Indirect Effects through Impacts to Habitats and Prey Species	Negligible	No	The likelihood that there would be a cumulative impact is **low** because the contribution from the Bellrock Wind Farm Infrastructure would be small and dependent on a temporal and spatial co-incidence of indirect effects from other plans or projects. Although some overlap with the Bellrock OfTDA is expected to occur, the negligible and localised effect of the Bellrock Wind Farm Infrastructure means that a contribution to any cumulative effect can be ruled out.
Impact O3: Disturbance and Displacement from the Physical Presence of WTGs	Negligible	Yes	There is a sufficient likelihood of a cumulative impact to justify a detailed, quantitative CEA.
Impact O4: Barrier to Movement (migratory non-seabirds)	Negligible	No	The likelihood that there would be a cumulative impact is **low** because the contribution from the Bellrock Wind Farm Infrastructure would be small and dependent on a temporal and spatial co-incidence of barrier effects from other plans or projects. Although some overlap with the Bellrock OfTDA is expected to occur, the negligible and localised effect of the Bellrock Wind Farm Infrastructure means that a contribution to any cumulative effect can be ruled out.
Impact O5: Collision with WTGs	Minor adverse	Yes	There is a sufficient likelihood of a cumulative impact to justify a detailed, quantitative CEA.

Potential Impact	Bellrock Wind Farm Infrastructure-alone Residual Effect	Potential for Cumulative Effects	Rationale
Impact O6: Combined Collision and Displacement	Minor adverse	Yes	There is a sufficient likelihood of a cumulative impact to justify a detailed, quantitative CEA.
Impact O7: Secondary Entanglement with Subsea Infrastructure	Minor adverse	No	The likelihood that there would be a cumulative impact is **low** because the contribution from the Bellrock Wind Farm Infrastructure would be small and dependent on a temporal and spatial co-incidence of entanglement effects from other plans or projects. Given the small number of floating structures (i.e. requiring mooring lines) proposed for the Bellrock OfTDA, these are unlikely to contribute to cumulative effects.
Impact O8: Artificial Lighting	Negligible	No	The likelihood that there would be a cumulative impact is **low** because the contribution from the Bellrock Wind Farm Infrastructure would be small and dependent on a temporal and spatial co-incidence of lighting effects from other plans or projects. Although some overlap with the Bellrock OfTDA is expected, the negligible and localised effect of the Bellrock Wind Farm Infrastructure means that a contribution to any cumulative effect can be ruled out.
Decommissioning Phase			
Impact D1: Temporary Disturbance and Displacement	Negligible	Yes	The likelihood that there would be a cumulative impact is **low** because the contribution from the Bellrock Wind Farm Infrastructure would be small and dependent on a temporal and spatial co-incidence of disturbance/displacement from other plans or projects. However, potential cumulative effects may occur with the Bellrock OfTDA given the proximity to the Bellrock WFDA.
Impact D2: Indirect Impacts	Minor adverse	Yes	The likelihood that there would be a cumulative impact is **low** because the contribution from the Bellrock Wind Farm Infrastructure would be small and dependent on a temporal and spatial co-incidence of indirect effects from other plans or projects. Potential cumulative effects may occur with the Bellrock OfTDA, as the scale of effect for the Bellrock Wind Farm Infrastructure alone exceeds a negligible level, and there is expected overlap of activities.

Potential Impact	Bellrock Wind Farm Infrastructure-alone Residual Effect	Potential for Cumulative Effects	Rationale
Impact D3: Artificial Lighting	Negligible	No	The likelihood that there would be a cumulative impact is **low** because the contribution from the Bellrock Wind Farm Infrastructure would be small and dependent on a temporal and spatial co-incidence of lighting impacts from other plans or projects. Although some overlap with the Bellrock OfTDA is expected, the negligible and localised effect of the Bellrock Wind Farm Infrastructure means that a contribution to any cumulative effect can be ruled out.

10.9.2 Screening of Other Plans, Projects and Activities

235. For this Chapter, projects within the foraging range of the Bellrock WFDA (as defined by Woodward et al. 2019) during the breeding season, and, except for guillemot, within the relevant BDMPS (as defined by Furness, 2015) during the non-breeding season were considered. For guillemot during the non-breeding period, the same region as for the breeding season was used, in accordance with NatureScot advice (2023b). As noted in the CEA methodology (**Section 10.4.2**), a cut-off for projects considered within the quantitative CEA (i.e. in respect of operational collision and displacement impacts) was set at April 2025. This cut-off was based on the outputs available from the Interim CEF and agreed with NatureScot to be used to inform the cumulative effects assessment (**Table 10.2**). For other impact pathways the cut-off was set at December 2025.

236. An evaluation of any likely changes to the in-combination assessment conclusions (i.e. for displacement and collision effects at the HRA scale after the April 2025 cut off is presented in the **Bellrock WFDA RIAA: Part 3 Appendix B: In-combination Assessment Update (Volume VI).**

237. Potential cumulative plans and projects were identified and screened in **Appendix 5.3: CEA Plans and Projects Screening (Volume IV)**. Those which have been subsequently scoped into the CEA for offshore ornithology are outlined in **Table 10.41**. For displacement and collision impacts, the cumulative mortalities for the other plans and projects were taken from the totals collated by the North East and East Ornithology Group (NEEOG) Interim CEF project, using the most recently available update to these totals (i.e. April 2025). Further information on the approach to deriving the cumulative mortality estimates is presented in **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)**.

238. Only projects where quantitative estimates of collision and displacement mortality are available have been included within the CEA, i.e. Tier 1 projects. While it is possible that future projects (i.e. Tiers 2 and 3) may contribute additional collision and displacement impacts to the cumulative effect there is currently no publicly available data for those projects that could be used for cumulative collision or displacement mortality estimates, and therefore it is not possible to include these within the assessment. It will be for those projects to consider such effects once their potential impacts have been quantified.

239. It should be noted that the CEA at the EIA scale, as set out in the following sections, has included effects from the consented Berwick Bank Wind Farm, in accordance with advice from NatureScot (**Table 10.2**). Although Berwick Bank would provide compensation for some species where the potential for adverse effects on SPA colonies has been identified (refer to the **Bellrock WFDA RIAA: Part 3 (Volume VI)** for further information), these would not apply to all colonies. Therefore, on a precautionary basis, the compensation to be provided by Berwick Bank has not been taken into account for the Bellrock WFDA CEA outputs that are detailed in the cumulative EIA sections below. **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)** presents cumulative EIA scale data (including PVA outputs) both with and without Berwick Bank, to inform on the level of predicted effects with Berwick Bank excluded.

240. For the cumulative assessment of displacement and collision impacts, further information on the derivation of the population and mortality estimates is provided in Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)**, with the supporting data provided in **Annex B** of **Appendix 10.4**; in summary:

- Values have been derived from the NEEOG Interim CEF project, using the most recently available update to these totals (i.e. April 2025), as agreed with NatureScot;
- During the breeding season, projects within breeding season foraging range of the Bellrock WFDA were included in the cumulative totals; those beyond were assigned a zero value. The predicted mortality estimates were apportioned to age class (adult and subadult) using the ratio of adults to subadults as determined from the respective breeding season in-combination mortality on the SPA populations for kittiwake and gannet and using the stable age distributions from the population models for guillemot, razorbill and puffin;
- During the non-breeding season, for all species except guillemot, all projects included in the NEEOG Interim CEF project were assumed to contribute to cumulative mortality on the basis that the regional populations are assumed to be distributed throughout the North Sea (for kittiwake) or North Sea and Channel (for razorbill, puffin and gannet) BDMPS regions during these periods. The mortality values were apportioned to age classes using the ratio of adults to subadults in the relevant BDMPS population. For species where the BDMPS population size was greater than the regional breeding population size (i.e. kittiwake and razorbill), the estimated mortality was corrected according to the ratio of the regional population size to the BDMPS population size (following the approach used by the Salamander Offshore Wind Farm and West of Orkney Windfarm submissions, which is in accordance with NatureScot advice as presented in the West of Orkney Windfarm additional information (MacArthur Green, 2024)); and
- For guillemot, non-breeding season connectivity was assumed to be the same as during the breeding season, so the cumulative mortality was derived from the same subset of plans and projects as for the breeding season with projects beyond foraging range of the Bellrock WFDA excluded from the totals. Again, values were apportioned to age class (adult and subadult) using the stable age distribution from the population model for guillemot.

241. Given that the Bellrock OnTDA would be located wholly within the terrestrial environment, there is no potential pathway for impact to offshore ornithology receptors that would be likely to contribute to cumulative effects with the Bellrock WFDA. Accordingly, the Bellrock OnTDA has not been considered further within the CEA. The proposed Bellrock OfTDA however, remains as part of the Tier 1 assessment, due to a potential receptor impact pathway.

Table 10.41: Other Plans and Projects Considered Within the Quantitative Bellrock Wind Farm Development Area Cumulative Effects Assessment for Offshore Ornithology, Derived from the North East and East Ornithology Group Interim Cumulative Effects Framework (Cut-off April 2025[5])

Offshore Wind Farm	Status at the Time of Preparing CEA (i.e. Application Submitted, Consented, etc)	Closest Straight-line Distance from Bellrock WFDA to Cumulative Project Boundary (km)	Across-sea Distance from the Bellrock WFDA to Cumulative Project Boundary (km)	Anticipated Grid Connection Date[1]	Data Confidence (High, Medium or Low)	Rationale
Ossian	In planning (Application submitted)	9	9	Earliest 2028 Latest 2033	High	Data confidence is high for all projects, as it has been sourced from the NEEOG interim CEF data, or from project-specific submissions for more recent projects. This is considered to be the best available data at the time of the Assessment for predicted mortality estimates (taking into account inherent uncertainty in such estimates), and therefore as robust as is possible at the time of the assessment.
Muir Mhòr	In planning (Application submitted)	52	52	2033		
Cenos	In planning (Application submitted)	61	61	2035		
Berwick Bank	Consented/Pre-construction	86	86	Earliest 2028 Latest 2031		
Seagreen Phase 1	Operational	86	86	N/A		
Hywind	Operational	95	95	N/A		
Seagreen Phase 1A	Consented/Pre-construction	96	96	2028		

[5] An evaluation of any likely changes to the in-combination assessment conclusions (i.e. for displacement and collision effects at the HRA scale, after the April 2025 cut off is presented in the **Bellrock WFDA RIAA Part 3**, **Appendix B: In-Combination Assessment Update (Volume VI)**. This evaluation takes into account projects that have been submitted (Aspen, Ayre, Buchan and MarramWind), have updated assessment data (Muir Mhòr, Caledonia and Ossian), and for which consent has been received and the Competent Authority has confirmed features where AEoSI has been confirmed (and hence compensation will be required; Salamander and West of Orkney in Scotland and Five Estuaries and Outer Dowsing in England) between April 2025 and February 2026.

Offshore Wind Farm	Status at the Time of Preparing CEA (i.e. Application Submitted, Consented, etc)	Closest Straight-line Distance from Bellrock WFDA to Cumulative Project Boundary (km)	Across-sea Distance from the Bellrock WFDA to Cumulative Project Boundary (km)	Anticipated Grid Connection Date[1]	Data Confidence (High, Medium or Low)	Rationale
Salamander	Consented/Pre-construction	98	98	2030		
Kincardine	Operational	100	100	N/A		
Green Volt	Consented/Pre-construction	107	107	Earliest 2029 Latest 2033		
Aberdeen (also known as the European Offshore Wind Deployment Centre (EOWDC)	Operational	115	115	N/A		
Inch Cape	Pre-construction	121	121	2027		
Neart na Gaoithe	Operational	136	136	N/A		
Caledonia	In planning (Application submitted)	183	183	Earliest 2031 Latest 2032		
Methil Demonstrator/ Forthwind	Consented	188	189	Unavailable		
Blyth Demonstrator[2]	Operational	189	189	N/A		
Moray East	Operational	199	199	N/A		
Dogger Bank B	Under construction	208	208	N/A		

Offshore Wind Farm	Status at the Time of Preparing CEA (i.e. Application Submitted, Consented, etc)	Closest Straight-line Distance from Bellrock WFDA to Cumulative Project Boundary (km)	Across-sea Distance from the Bellrock WFDA to Cumulative Project Boundary (km)	Anticipated Grid Connection Date[1]	Data Confidence (High, Medium or Low)	Rationale
Moray West	Operational	209	209	N/A		
Beatrice	Operational	218	218	N/A		
Sofia	Under construction	221	221	N/A		
Dogger Bank A	Under construction	236	236	N/A		
Dogger Bank C	Under construction	236	236	N/A		
Dogger Bank South	In planning (Application submitted)	240	263	Earliest 2030 Latest 2031		
Teesside	Operational	244	255	N/A		
Pentland Firth Offshore Wind Farm (PFOWF)	Consented/Pre-construction	292	322	2027		
Hornsea 4[3]	Consented (Discontinued in current form)	300	300	Earliest 2028 Latest 2029		
West of Orkney	Consented/Pre-construction	313	322	Earliest 2029 Latest 2030		
Hornsea 2	Operational	322	322	N/A		
Westermost Rough	Operational	326	326	N/A		

Offshore Wind Farm	Status at the Time of Preparing CEA (i.e. Application Submitted, Consented, etc)	Closest Straight-line Distance from Bellrock WFDA to Cumulative Project Boundary (km)	Across-sea Distance from the Bellrock WFDA to Cumulative Project Boundary (km)	Anticipated Grid Connection Date[1]	Data Confidence (High, Medium or Low)	Rationale
Hornsea 1	Operational	329	329	N/A		
Hornsea 3	Construction	337	337	Earliest 2026 Latest 2028		
Humber Gateway	Operational	346	346	N/A		
Outer Dowsing[4]	In planning (Application submitted)	358	358	2030		
Triton Knoll	Operational	364	364	N/A		
Race Bank	Operational	386	386	N/A		
Dudgeon Extension	Consented/Pre-construction	388	388	Earliest 2030 Latest 2034		
Lincs	Operational	394	394	N/A		
Dudgeon	Operational	395	395	N/A		
Inner Dowsing	Operational	397	397	N/A		
Sheringham Shoal Extension	Consented/Pre-construction	399	399	Earliest 2030 Latest 2034		
Lynn	Operational	405	405	N/A		

Offshore Wind Farm	Status at the Time of Preparing CEA (i.e. Application Submitted, Consented, etc)	Closest Straight-line Distance from Bellrock WFDA to Cumulative Project Boundary (km)	Across-sea Distance from the Bellrock WFDA to Cumulative Project Boundary (km)	Anticipated Grid Connection Date[1]	Data Confidence (High, Medium or Low)	Rationale
Sheringham Shoal	Operational	407	407	N/A		
Norfolk Boreas	Consented	435	435	Earliest 2029 Latest 2030		
Norfolk Vanguard	Under construction	445	445	Earliest 2025 Latest 2028		
Scroby Sands	Operational	472	472	N/A		
East Anglia THREE	Under construction	479	479	2027		
East Anglia ONE NORTH	Consented/Pre-construction	505	505	Earliest 2029 Latest 2034		
East Anglia ONE	Operational	520	520	N/A		
East Anglia TWO	Consented/Pre-construction	516	516	Earliest 2030 Latest 2034		
North Falls	In planning (Application submitted)	545	548	2030		
Galloper	Operational	547	547	N/A		
Five Estuaries	In planning (Application submitted)[5]	549	549	2030		

Offshore Wind Farm	Status at the Time of Preparing CEA (i.e. Application Submitted, Consented, etc)	Closest Straight-line Distance from Bellrock WFDA to Cumulative Project Boundary (km)	Across-sea Distance from the Bellrock WFDA to Cumulative Project Boundary (km)	Anticipated Grid Connection Date[1]	Data Confidence (High, Medium or Low)	Rationale
Greater Gabbard	Operational	548	552	N/A		
Gunfleet Sands I and II	Operational	565	586	N/A		
London Array	Operational	573	585	N/A		
Kentish Flats and Extension	Operational	595	621	N/A		
Thanet	Operational	601	608	N/A		
Rampion	Operational	675	785	N/A		
Rampion 2	Consented	676	783	2026		

Notes:

[1] Source: NESO TEC Register 25 November 2025.

[2] 'Blyth Demonstrator' is as set out in the NEEOG interim CEF; it is assumed that this comprises the combined Phase 1 and Phase 2 Byth Demonstrator projects.

[3] Although Hornsea 4 has been 'discontinued' (in its current form) by its developer it remains a consented project and is included in the CEA, in accordance with advice from NatureScot.

[4] Outer Dowsing was granted development consent in January 2026. However, as the CEA Screening applied a project status cut-off of the start of December 2025 (approximately four months prior to submission), the project has been included in the CEA based on its status at that time.

[5] Five Estuaries received its Development Consent Order on 17 December 2025.

10.9.3 Potential Cumulative Effects During Construction

10.9.3.1 Impact C1: Temporary Disturbance and Displacement

242. The Bellrock Wind Farm Infrastructure alone assessment has considered the effects of temporary disturbance and displacement during the construction phase on four species; guillemot, razorbill, puffin and gannet. Further information on this impact pathway is provided in **Section 10.8.1.1**. For all species considered the magnitude of impact is considered small (i.e. negligible) as a result of the Bellrock Wind Farm Infrastructure alone. However, the predicted mortality could contribute to cumulative effects with other projects.

243. For significant cumulative effects to occur, temporal and spatial overlap between construction activities associated with the Bellrock WFDA and other projects would be required. While some temporal overlap with other projects may occur, impacts would be intermittent and localised to the respective project activities. As the magnitude of impact would also be small and localised, it is considered unlikely that cumulative effects with the OWFs set out in **Table 10.41** would result in any substantive increase in cumulative effect. However, given the likely temporal and spatial link between the Bellrock WFDA and OfTDA, the cumulative effect of these two projects has been considered.

10.9.3.1.1 Sensitivity

244. All four species considered for the cumulative assessment are assessed as having **medium** sensitivity to disturbance and displacement effects (refer to **Section 10.8.1.1.1**).

10.9.3.1.2 Magnitude of Cumulative Impact

245. At this stage, limited information is available on the scope and duration of construction activity associated with the Bellrock OfTDA (given the change to the grid connection solution imposed by the National Energy System Operator (NESO) in April 2025 (see Section 4.1.2 in **Chapter 4: Project Description (Volume II)**). The key elements of this work would comprise the installation of the offshore export cables, interconnectors, offshore reactive compensation station(s) and up to six offshore substations. The activities associated with the installation of these features would, in terms of disturbance risk to sensitive bird species, be broadly similar to those for the construction of the Bellrock Wind Farm Infrastructure. These would include noise and visual disturbance from construction vessels, and UXO clearance (if required). Such activities would be localised and occur for relatively short periods at any one location. Overall, effects would be expected to be of lower magnitude than for the Bellrock Wind Farm Infrastructure, given the relatively small footprint of work areas (e.g. up to six offshore substations for the OfTDA compared to up to 132 WTGs for the WFDA). Therefore, while there is the potential that the effects of the two activities could combine, the overall magnitude of impact is unlikely to be substantially greater than for the Bellrock WFDA alone assessment (refer to **Section 10.8.1.1.2**). Overall, therefore, the magnitude is considered to be **negligible** for each of the four assessed species.

10.9.3.1.3 Significance of Cumulative Effect

246. Overall, it is predicted that sensitivity/value for guillemot, razorbill, puffin and gannet is **medium,** and the magnitude of impact is **negligible**. The cumulative effect is therefore of **negligible** significance, which is **not significant** in EIA terms.

10.9.3.2 Impact C2: Indirect Effects Through Impacts to Habitats and Prey Species

247. The Bellrock WFDA alone assessment has considered the construction phase effects of indirect impacts to habitats and prey species for all seabird receptors considered in the assessment (kittiwake, great black-backed gull, Arctic tern, Arctic skua, gannet, guillemot, razorbill and puffin). Further information on this impact pathway is provided in **Section 10.8.1.2**. For all species considered the magnitude of impact is considered to be **low** as a result of the Bellrock Wind Farm Infrastructure alone. However, the effects could contribute to cumulative effects with other projects.

248. For significant cumulative effects to occur, temporal and spatial overlap between construction activities associated with the Bellrock WFDA and other projects would be required. While some temporal overlap with other projects may occur, impacts would be intermittent and localised to the respective project activities. As the magnitude of impact would also be small and localised, it is considered unlikely that cumulative effects with the OWFs set out in **Table 10.41** would result in any substantive increase in cumulative effect. However, given the likely temporal and spatial link between the Bellrock WFDA and OfTDA, the cumulative effect of these two projects has been considered.

10.9.3.2.1 Sensitivity

249. All species considered for the cumulative assessment are assessed as having **medium** sensitivity to disturbance and displacement effects (refer to **Section 10.8.1.2.1**).

10.9.3.2.2 Magnitude of Cumulative Impact

250. At this stage, limited information is available on the scope and duration of construction activity associated with the Bellrock OfTDA (given the change to the grid connection solution imposed by NESO in April 2025 (see Section 4.1.2 in **Chapter 4: Project Description (Volume II)**). The key elements of this work would comprise the installation of the offshore export cables, interconnector cables, offshore reactive compensation station(s) and up to six offshore substations. The activities associated with the installation of these features would, in terms of effects on habitats and prey species, be broadly similar to those for the construction of the Bellrock Wind Farm Infrastructure. Such activities would be localised and occur for relatively short periods at any one location. Overall, effects would be expected to be of lower magnitude than for the Bellrock WFDA alone assessment, given the relatively small footprint of work areas (e.g. six offshore substations for the OfTDA compared to up to 132 WTGs for the WFDA). Therefore, while there is the potential that the effects of the two activities could combine, the overall magnitude of impact is unlikely to be substantially greater than for the Bellrock WFDA alone (refer to **Section 10.8.1.2.2**). Overall, therefore, the magnitude is considered (as a worst case) to be **low** for each of the assessed species.

10.9.3.2.3 Significance of Cumulative Effect

251. Overall, it is predicted that sensitivity/value for the relevant species is **medium,** and the magnitude of impact is **low**. The cumulative effect (worst case) is therefore of **minor adverse** significance, which is **not significant** in EIA terms.

10.9.4 Potential Cumulative Effects During Operation and Maintenance of the Bellrock Wind Farm Infrastructure

10.9.4.1 Impact O3: Disturbance and Displacement from the Physical Presence of WTGs

252. The Bellrock WFDA alone assessment has considered the effects of disturbance and displacement on five species; kittiwake, guillemot, razorbill, puffin and gannet. Further information on this impact pathway is provided in **Section 10.8.2.3**. For all species considered the magnitude of impact is considered small (i.e. negligible) as a result of the Bellrock Wind Farm Infrastructure alone. However, the predicted mortality could contribute to cumulative effects with other projects.

253. As set out in **Section 10.9.2**, cumulative mortality estimates for disturbance and displacement (and for Impact 05 Collision, as assessed in **Section 10.9.4.2**) have utilised data from the NEEOG Interim CEF project. The CEA has sought to report project contributions consistently between projects; however, in some cases the source data has combined estimates for two or more projects. In these cases, combined project estimates have been presented in the tables.

10.9.4.1.1 Sensitivity

254. All five species considered for the cumulative assessment are assessed as having **medium** sensitivity to disturbance and displacement effects (refer to **Section 10.8.2.3.1**).

10.9.4.1.2 Magnitude of Cumulative Impact

10.9.4.1.2.1 Kittiwake

255. **Table 10.42** sets out the kittiwake population at risk of displacement effects for each of the projects considered for the cumulative assessment for this species. In total, 254,002 kittiwakes are considered to be at risk of displacement across all projects. Further information on the derivation of this estimate is provided in Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume VI)**, with the supporting data provided in Annex B, and summarised in **Paragraph 240** above.

Table 10.42: Estimate of Kittiwake Populations at Risk of Displacement for Projects Considered in the Cumulative Assessment

Wind Farm	Autumn Passage	Spring Passage	Breeding Season	Annual
Inch Cape	1,069	1,069	3,866	6,004
Neart na Gaoithe	2,016	139	2,164	4,319
Seagreen Phase 1 and 1A	2,286	2,286	3,235	7,807
Beatrice	1,112	1,112	1,430	3,654
Moray East	-	-	1,963	1,963
Moray West	1,470	1,074	6,902	9,446

Wind Farm	Autumn Passage	Spring Passage	Breeding Season	Annual
Aberdeen	14	23	663	700
Hywind	-	-	112	112
Kincardine	-	-	229	229
Methil	-	-	184	184
Blyth Demo	740	740	591	2,071
Dogger Bank A & B	3,450	15,482	7,898	26,830
Dogger Bank C & Sofia	2,181	11,805	4,395	18,381
Hornsea 1	31,481	767	0	32,248
Hornsea 2	1,449	1,975	0	3,424
Hornsea 3	2,550	3,795	0	6,345
Hornsea 4	3,608	2,626	3,771	10,005
Norfolk Vanguard	916	1,294	0	2,210
Norfolk Boreas	2,576	949	0	3,525
East Anglia ONE	1,158	758	0	1,916
East Anglia THREE	3,419	1,309	0	4,728
East Anglia ONE North	159	435	0	594
East Anglia TWO	127	301	0	428
Triton Knoll	332	226	0	558
Sheringham Extension & Dudgeon Extension	1,481	1,217	0	2,698
Berwick Bank Wind Farm	11,190	13,766	21,141	46,097
PFOWF	118	41	0	159
Green Volt	149	83	183	415
West of Orkney	799	1,217	0	2,016
Salamander	142	155	3,719	4,015
Cenos	97	49	209	355
Ossian	566	581	3,183	4,330
Muir Mhòr	58	751	3,252	4,061

Wind Farm	Autumn Passage	Spring Passage	Breeding Season	Annual
Caledonia	483	115	2,039	2,637
Rampion 2	97	286	0	383
Five Estuaries	238	573	0	811
North Falls	467	845	0	1,312
Outer Dowsing	5,207	1,760	0	6,967
Dogger Bank South	7,353	11,307	10,915	29,575
TOTAL excluding Bellrock WFDA	**90,557**	**80,909**	**82,043**	**253,509**
Bellrock WFDA	94	84	314	493
TOTAL including Bellrock WFDA	**90,651**	**80,994**	**82,357**	**254,002**

256. Assuming 30% displacement and 1% to 3% mortality of displaced birds, the predicted cumulative mortality estimate (including Berwick Bank; refer to **Paragraph 239**) is 247 to 741 in the breeding season, 272 to 816 in the autumn migration season and 243 to 729 in the spring migration season, or 762 to 2,286 birds annually. Assuming a regional population of 829,937 (**Table 10.16**), and an average annual mortality rate of 0.157 (**Table 10.21**), this is equivalent to an annual increase in background mortality of 0.58% to 1.75% (refer to **Table 10.43**).

Table 10.43: Estimated Cumulative Displacement Mortality for Kittiwake by Seasonal Period in Relation to Baseline Mortality

Season	Estimated Cumulative Seasonal Displacement Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality
Breeding	247 – 741	686,236	107,739	0.23% – 0.69%
Autumn migration	272 – 816	829,937	130,300	0.21% – 0.63%
Spring migration	243 – 729	627,816	98,567	0.25% – 0.74%
Total	**762 – 2,286**	**829,937**	**130,300**	**0.58% – 1.75%**

Notes:

[1] Assumes an annual average mortality rate of 0.157 (**Table 10.21**).

257. A total annual mortality of 762 to 2,286 birds is equivalent to an annual mortality of 415 to 1,245 adult birds from the breeding population with connectivity to the Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.1326 to 0.3978 (refer to **Paragraph 240** for an explanation as to how these values have been derived, together with Table 2.18 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)**).

10.9.4.1.2.1.1 Population Viability Analysis

258. As the percentage point increase in the rate of baseline breeding adult mortality is above 0.02, PVA has been undertaken, in accordance with NatureScot guidance (NatureScot, 2023g). The PVA has been carried out considering a range of displacement and mortality rates. The results of the PVAs for predicted cumulative displacement impacts (including Berwick Bank; refer to **Paragraph 239**) for the kittiwake regional SPA population over the 35-year operational life of the Bellrock Wind Farm Infrastructure and 15 years post-operation recovery period is summarised in **Table 10.44**. Further details of the PVA methodology, input parameters and an explanation of how to interpret the PVA results can be found in **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)**.

Table 10.44: Population Viability Analysis for Predicted Cumulative Displacement Mortality for Kittiwake

Projection Period	Impact Scenario	Median Population Size	Annual Growth Rate (Median)	Median CPGR	Median CPS
35 years	**Baseline (no impact)**	1,296,943	1.034	N/A	N/A
	Displacement lower	1,240,171	1.033	0.999	0.957
	Displacement upper	1,137,633	1.030	0.996	0.877
50 years	**Baseline (no impact)**	2,130,223	1.034	N/A	N/A
	Displacement lower	2,040,057	1.033	0.999	0.958
	Displacement upper	1,867,845	1.031	0.997	0.878

259. During the 35-year operational life of the Bellrock Wind Farm Infrastructure, the kittiwake regional population is predicted to increase under the unimpacted scenario. Under both the lower and upper estimates of displacement mortality, the population is still predicted to increase, with only a very small reduction in growth rate (99.9% and 99.6%) and population size (95.7% and 87.7%) relative to the unimpacted population. These values indicate that the PVA did not

predict a significant negative effect from the cumulative effects of displacement mortality on the kittiwake regional breeding population after 35 years.

260. In addition, as outlined in **Section 10.9**, these outputs include the potential effects from the Berwick Bank Wind Farm, although to a large extent the effects from the Berwick Bank Wind Farm on the regional kittiwake population will be offset by the compensation that is required in relation to those SPA kittiwake populations for which adverse effects were concluded (**Bellrock WFDA RIAA: Part 3**, **(Volume VI)**). Thus, with the potential effects from the Berwick Bank Wind Farm excluded, the predicted reductions in annual population growth rate and end population size of the impacted population relative to the unimpacted population are only 99.9% to 99.7% and 96.5% to 89.9%, respectively **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)**. While the assessment has not relied on the outputs that exclude the potential effects from Berwick Bank (i.e. the compensation that it would provide has not been used to reach the assessment conclusions), these results demonstrate that there is additional precaution in the assessment conclusions.

261. During the 15-year recovery period following the Bellrock Wind Farm Infrastructure's operational life, the PVA indicates that there would be a slight recovery in the counterfactual growth rate and population size, but this would remain slightly below the predicted rates under the unimpacted scenario. While this indicates that there would not be a complete recovery during the first 15 years of the post-operation recovery period, the differences are so small that it is unlikely they would be detectable at a population level.

262. UK population trends for kittiwake documented by Burnell et al. (2023) indicate that this species has declined, with a 42% reduction in population since 2000. Effects in more northerly latitudes have been particularly marked, with declines of 80% and 89% reported from Shetland and Orkney respectively. Colonies on the east coast of Scotland have also shown substantial decline, with, for example, Caithness and Kincardine & Deeside showing declines of 42% and 47% respectively. However, it is not considered that offshore wind farms are a significant factor in this decline, rather it is mainly attributed to factors such as prey availability, local predation pressure and extreme weather events (Burnell et al. 2023), (Furness and Tasker, 2000), (Frederiksen et al. 2008) and (Carroll et al. 2017). The cumulative effects of offshore wind development are therefore unlikely to have a measurable impact on the overall population trend for this species.

263. The cumulative impact is predicted to be of national spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, after which time the Bellrock WFDA would no longer contribute to cumulative effects, and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, as the PVA does not predict significant population effects the magnitude of the impact is considered to be **low**.

10.9.4.1.2.2 Guillemot

264. **Table 10.45** sets out the guillemot population at risk of displacement effects for each of the projects considered for the cumulative assessment for this species. In total, 678,925 guillemots are considered to be at risk of displacement across all projects (including Berwick Bank; refer to **Paragraph 239**). Further information on the derivation of this estimate is provided in Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report**

(Volume VI), with the supporting data provided in Annex B, and summarised in **Paragraph 240** above.

Table 10.45: Estimate of Guillemot Populations at Risk of Displacement for Projects Considered in the Cumulative Assessment

Wind Farm	Breeding Season	Non-breeding season	Annual
Ossian	27,247	48,340	75,587
Muir Mhòr	13,122	11,863	24,985
Cenos	2,497	8,319	10,816
Seagreen	24,724	8,800	33,524
Berwick Bank Wind Farm	74,154	44,171	118,325
Hywind	249	2,136	2,385
Salamander	11,677	6,084	17,760
Kincardine	632	0	632
Green Volt	4,429	16,105	20,534
Aberdeen	547	225	772
Inch Cape	4,371	3,177	7,548
Neart na Gaoithe	1,755	3,761	5,516
Caledonia	16,092	6,710	22,802
Methil Demo/Forthwind	25	0	25
Blyth Demo Phase 1	1,220	1,321	2,541
Moray (East)	9,820	547	10,367
Dogger Bank A & B	14,886	16,763	31,649
Moray West	24,426	38,174	62,600
Beatrice	13,610	2,755	16,365
Dogger Bank C & Sofia	8,494	5,969	14,463
Dogger Bank South	17,814	42,623	60,437
Teesside	267	901	1,168
Hornsea 4	9,382	36,965	46,347
PFOWF	1,146	651	1,797

Wind Farm	Breeding Season	Non-breeding season	Annual
West of Orkney	7,973	4,393	12,366
Hornsea 2	7,735	13,164	20,899
Westermost Rough	347	486	833
Hornsea 1	9,836	8,097	17,933
Hornsea 3	13,374	17,772	31,146
TOTAL excluding Bellrock WFDA	**321,851**	**350,271**	**672,122**
Bellrock WFDA	790	6,013	6,803
TOTAL including Bellrock WFDA	**322,641**	**356,284**	**678,925**

265. Assuming 60% displacement, 3% to 5% mortality of displaced birds in the breeding season and 1% to 3% of displaced birds in non-breeding season, the predicted cumulative mortality estimate is 5,808 to 9,679 in the breeding season, 2,138 to 6,413 in the non-breeding period, or 7,945 to 16,092 birds annually. Assuming a regional population of 1,983,885 (**Table 10.16**), and an average annual mortality rate of 0.139 (**Table 10.21**), this is equivalent to an annual increase in background mortality of 2.88% to 5.84% (refer to **Table 10.46**).

Table 10.46: Estimated Cumulative Displacement Mortality for Guillemot by Seasonal: Period in Relation to Baseline Mortality

Season	Estimated Seasonal Displacement Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality (%)
Breeding	5,808 – 9,679	1,983,885	275,760	2.11% – 3.51%
Non-breeding	2,138 – 6,413	1,617,306	224,806	0.95% – 2.85%
Total	**7,945 – 16,092**	**1,983,885**	**275,760**	**2.88% – 5.84%**

Notes:

[1] Assumes an annual average mortality rate of 0.139 (**Table 10.21**)

266. A total annual mortality of 7,945 to 16,092 birds is equivalent to an annual mortality of 3,813 to 7,797 adult birds from the breeding population with connectivity to Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.3800 to 0.7770 (refer to Table 2.18 of **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)** for derivation of these values).

10.9.4.1.2.2.1 Population Viability Analysis

267. As the percentage point increase in the rate of baseline breeding adult mortality is above 0.02, PVA has been undertaken, in accordance with NatureScot guidance (NatureScot, 2023g). The PVA has been carried out considering a range of displacement and mortality rates. The results of the PVAs for predicted cumulative displacement impacts (including Berwick Bank; refer to **Paragraph 239**) for the guillemot regional SPA population over the 35-year operational life of the Bellrock WFDA and 15 years post-operation recovery period is summarised in **Table 10.47**. Further details of the PVA methodology, input parameters and an explanation of how to interpret the PVA results can be found in **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)**.

Table 10.47: Population Viability Analysis for Predicted Cumulative Displacement Mortality for Guillemot

Projection Period	Impact Scenario	Median Population Size	Annual Growth Rate (Median)	Median CPGR	Median CPS
35 years	**Baseline (no impact)**	**4,018,386**	**1.0331**	**N/A**	**N/A**
	Displacement lower	3,436,715	1.0286	0.9957	0.8552
	Displacement upper	2,919,532	1.0240	0.9912	0.7265
50 years	**Baseline (no impact)**	**6,526,986**	**1.0330**	**N/A**	**N/A**
	Displacement lower	5,576,046	1.0298	0.9969	0.8543
	Displacement upper	4,732,964	1.0265	0.9937	0.7250

268. During the 35-year operational life of the Bellrock Wind Farm Infrastructure, the guillemot regional population is predicted to increase under the unimpacted scenario. Under both the lower and upper estimates of displacement mortality, the population is still predicted to increase, although a reduction in growth rate (99.57% and 99.12%) and population size (85.52% and 72.65%) relative to the unimpacted population is predicted. These values indicate that the PVA did not predict a significant negative effect from the cumulative effects of displacement mortality on the guillemot regional breeding population after 35 years. It is noted that for the upper displacement rate a 27.5% reduction in population size is predicted; however, the upper displacement and mortality rates are higher than evidence suggests (Norfolk Vanguard Limited 2019), and may therefore, overestimate the actual effect.

269. In addition, as outlined in **Section 10.9**, these outputs include the potential effects from the Berwick Bank Wind Farm, although to a large extent the effects from the Berwick Bank Wind Farm on the regional guillemot population will be offset by the compensation that is required in relation to those SPA guillemot populations for which adverse effects were concluded (**Bellrock WFDA RIAA: Part 3**, **(Volume VI)**). Thus, with the potential effects from the Berwick Bank Wind Farm excluded, the predicted reductions in annual population growth rate and end population size of the impacted population relative to the unimpacted population are only 99.65% to 99.28% and 88.24% to 77.13%, respectively **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)**. While the assessment has not relied on the outputs that exclude the potential effects from Berwick Bank (i.e. the compensation that it would provide has not been used to reach the assessment conclusions), these results demonstrate that there is additional precaution in the assessment conclusions.

270. UK population trends for guillemot documented by Burnell et al. (2023) indicate that this species has declined by 8% since 2000. This follows a substantial increase during the latter half of the 20th Century, with, for example, an increase of 33% between 1988 and 2000. The post-2000 changes are not consistent between colonies, with some increasing (particularly in the south and west of the UK) and some declining (generally towards the north and east). On the east coast of Scotland, the picture is also mixed, with, for example the population is Caithness declining by 17%, while Kincardine & Deeside has increased by 5%. Overall, the Scottish population has declined by 31% since 2000, with the largest declines in Orkney (41%) and Shetland (55%) (Burnell et al. 2023). However, it is not considered that offshore wind farms are a significant factor in this decline, which is mainly attributed to factors such as prey availability, climate effects (including extreme weather events) and anthropogenic factors, such as oil spills and fishery impacts (Burnell et al. 2023). Therefore, while there is some uncertainty about the cumulative effects of offshore wind development on guillemots, it is considered unlikely that this would have a measurable impact on the overall population trend for this species.

271. During the 15-year recovery period following the Bellrock Wind Farm Infrastructure's operational life, the PVA indicates that there would be a slight recovery in the counterfactual growth rate, although no recovery in counterfactual population size is predicted for this period.

272. The cumulative impact is predicted to be of national spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, after which time the infrastructure would no longer contribute to cumulative effects, and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, as the PVA does not predict significant population effects (particularly for the more realistic lower displacement and mortality rates), the magnitude of the impact is considered to be **low**.

10.9.4.1.2.3 Razorbill

273. **Table 10.48** sets out the razorbill population at risk of displacement effects for each of the projects considered for the cumulative assessment for this species. In total, 237,636 razorbills are considered to be at risk of displacement across all projects (including Berwick Bank; refer to **Paragraph 239**). Further information on the derivation of this estimate is provided in Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)**, with the supporting data provided in Annex B, and summarised in **Paragraph 240** above.

Table 10.48: Estimate of Razorbill Populations at Risk of Displacement for Projects Considered in the Cumulative Assessment

Wind Farm	Breeding season	Autumn passage	Winter	Spring passage	Annual
Beatrice	0	833	555	833	3,094
Blyth Demonstrator	0	91	61	91	364
Dudgeon	0	346	745	346	1,693
East Anglia ONE	0	26	155	336	533
Aberdeen Bay	161	64	7	26	258
Galloper	0	43	106	394	587
Greater Gabbard	0	0	387	84	471
Gunfleet Sands I and II	0	0	30	0	30
Hornsea 1	0	4,812	1,518	1,803	9,242
Humber Gateway	0	20	13	20	80
Hywind	30	719	10	-	759
Kentish Flats and Extension	-	-	-	-	0
Kincardine	22	-	-	-	22
Lincs, Lynn & Inner Dowsing[1]	0	34	22	34	135
London Array	0	20	14	20	68
Methil	0	0	0	0	4
Moray East	0	1,103	30	168	3,724
Race Bank	0	42	28	42	140
Rampion	0	66	1,244	3,327	5,267
Scroby Sands	-	-	-	-	0
Sheringham Shoal	0	1,343	211	30	1,690
Teesside	0	61	2	20	99
Thanet	0	0	14	21	38
Westermost Rough	0	121	152	91	455
Dogger Bank A	0	1,576	1,728	4,149	8,703

Wind Farm	Breeding season	Autumn passage	Winter	Spring passage	Annual
Dogger Bank B	0	2,097	2,143	5,119	10,897
Seagreen Alpha[2]	5,876	-	1,103	-	6,979
Seagreen Bravo[2]	3,698	-	1,272	-	4,970
Hornsea 2	0	4,221	720	1,668	9,120
Neart na Gaoithe	0	5,492	508	-	6,331
Triton Knoll	0	254	855	117	1,266
Dogger Bank C	0	310	959	1,919	4,022
Sofia	0	592	1,426	2,953	6,124
East Anglia ONE North	0	85	54	207	749
East Anglia THREE	0	1,122	1,499	1,524	5,952
East Anglia TWO	0	44	136	230	691
Hornsea 3	0	2,020	3,649	2,105	8,404
Inch Cape	1,436	2,870	651	-	4,957
Moray West	0	3,544	184	3,585	10,121
Norfolk Boreas	0	263	1,065	345	2,303
Norfolk Vanguard	0	866	839	924	3,508
Hornsea 4	0	4,311	455	449	5,601
Dudgeon Extension	0	759	686	144	1,905
Sheringham Extension	0	3,741	845	320	5,829
PFOWF	0	17	16	14	181
Green Volt	457	56	15	28	556
Berwick Bank	4,040	8,849	1,399	7,480	21,768
West of Orkney	0	112	19	132	405
Salamander	704	484	28	0	1,215
Cenos	0	0	0	0	0
Ossian	2,608	1,493	138	224	4,463
Muir Mhòr	1,549	1,388	42	117	3,096

Wind Farm	Breeding season	Autumn passage	Winter	Spring passage	Annual
Caledonia	0	1841	253	530	4,386
Rampion 2	0	26	1,193	6,303	7,554
Outer Dowsing	0	2,185	1,779	5,134	13,040
Five Estuaries	0	284	1,066	980	2,427
North Falls	0	248	1,781	1,741	3,874
Dogger Bank South	0	9,931	8,443	9,280	36,080
TOTAL excluding Bellrock WFDA	**20,581**	**70,825**	**42,253**	**65,407**	**199,066**
Bellrock WFDA	1,300	0	6	100	1,406
TOTAL including Bellrock WFDA	**21,881**	**70,825**	**42,259**	**65,507**	**200,472**

Notes:

[1] In the case of Razorbill, the source of the potential mortalities from displacement (RHDHV (2023) - Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects Gannet and Auk Cumulative Displacement Updates Technical Note (revision A, Deadline 5)) gives the numbers for the Lincs, Lynn and Inner Dowsing wind farms as a combined total, and they are displayed as such in this table. This is unlike the other species which may have separate totals for Lincs, Lynn and Inner Dowsing.

[2] For this species, data for Seagreen Alpha and Seagreen Bravo are presented separately in the NEEOG interim CEF. Together, these two projects are equivalent to Seagreen Phase 1 and Seagreen Phase 1A combined.

274. Assuming 60% displacement and 3% to 5% mortality of displaced birds during the breeding season, and 1% to 3% mortality in the non-breeding seasons, the predicted cumulative mortality estimate is 394 to 656 in the breeding season, 425 to 1,275 in the autumn migration season, 254 to 761 in the winter period and 393 to 1,179 in the spring migration season, or 1,465 to 3,871 birds annually. Assuming a regional population of 591,874 (**Table 10.16**), and an average annual mortality rate of 0.177 (**Table 10.21**), this is equivalent to an annual increase in background mortality of 1.40% to 3.70% (refer to **Table 10.49**).

Table 10.49: Estimated Cumulative Displacement Mortality for Razorbill by Seasonal Period in Relation to Baseline Mortality

Season	Estimated Cumulative Seasonal Displacement Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality (%)
Breeding	394 – 656	55,220	9,774	4.03% – 6.72%
Autumn migration	425 – 1,275	591,874	104,762	0.41% – 1.22%
Winter	254 – 761	218,622	38,696	0.66% – 1.97%
Spring migration	393 – 1,179	591,874	104,762	0.38% – 1.13%
Total	1,465 – 3,871	591,874	104,762	1.40% – 3.70%

Notes:

[1] Assumes an annual average mortality rate of 0.177 (**Table 10.21**).

275. A total annual mortality of 1,465 to 3,871 birds is equivalent to an annual mortality of 244 to 497 adult birds from the breeding population with connectivity to Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.9175 to 1.8681 (refer to **Table 2.18** of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report Volume VI** for derivation of these values).

10.9.4.1.2.3.1 Population Viability Analysis

276. As the percentage point increase in the rate of baseline breeding adult mortality is above 0.02, PVA has been undertaken, in accordance with NatureScot guidance (NatureScot, 2023g). The PVA has been carried out considering a range of displacement and mortality rates. The results of the PVAs for predicted cumulative displacement impacts (including Berwick Bank; refer to **Paragraph 239**) for the razorbill regional SPA population over the 35-year operational life of the Bellrock Wind Farm Infrastructure and 15 years post-operation recovery period is summarised in **Table 10.50**. Further details of the PVA methodology, input parameters and an explanation of how to interpret the PVA results can be found in **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume VI)**.

Table 10.50: Population Viability Analysis for Predicted Cumulative Displacement Mortality for Razorbill

Projection Period	Impact Scenario	Median Population Size	Annual Growth Rate (Median)	Median CPGR	Median CPS
35 years	**Baseline (no impact)**	**75,596**	**1.0250**	**N/A**	**N/A**
	Displacement lower	51,307	1.0140	0.9893	0.6790
	Displacement upper	34,408	1.0027	0.9783	0.4538
50 years	**Baseline (no impact)**	**109,730**	**1.0249**	**N/A**	**N/A**
	Displacement lower	74,437	1.0172	0.9924	0.6784
	Displacement upper	49,570	1.0091	0.9846	0.4532

277. During the 35-year operational life of the Bellrock Wind Farm Infrastructure, the razorbill regional population is predicted to increase under the unimpacted scenario. Under both the lower and upper estimates of displacement mortality, the population is still predicted to increase, with only a small reduction in growth rate (98.93% and 97.83%). However, a significantly lower population size is predicted, with a 32.16% to 54.68% reduction relative to the unimpacted population at the end of the 35-year period.

278. In addition, as outlined in **Section 10.9**, these outputs include the potential effects from the Berwick Bank Wind Farm, although to a large extent the effects from the Berwick Bank Wind Farm on the regional razorbill population will be offset by the compensation that is required in relation to those SPA razorbill populations for which adverse effects were concluded (**Bellrock WFDA RIAA: Part 3 (Volume VI)**). With the potential effects from the Berwick Bank Wind Farm excluded, the predicted reductions in annual population growth rate are 99.10% to 98.14%, leading to a reduction of 27.85% to 49.13% in the end population size of the impacted population relative to the unimpacted population (**Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume VI**). While the assessment has not relied on the outputs that exclude the potential effects from Berwick Bank (i.e. the compensation that it would provide has not been used to reach the assessment conclusions), these results demonstrate that there is additional precaution in the assessment conclusions.

279. Irrespective of whether the potential effects from Berwick Bank are included or excluded, these results should be treated with caution for two reasons. Firstly, the level of displacement and mortality, particularly for the upper value, is considered to be higher than evidence suggests is the case (Norfolk Vanguard Limited, 2019). Secondly, and most critically, the levels of predicted impact are an inevitable artefact of the Bellrock WFDA being far offshore, given the approach used to determine the cumulative impact (which follows previous NatureScot advice (**Appendix**

10.4: Offshore Ornithology Population Viability Technical Report (Volume VI)). This is because the regional populations are defined by the breeding colonies within the breeding season foraging range of the Bellrock WFDA, but this encompasses very few razorbill colonies which means that the regional population is small (55,220 individuals (26,583 adults plus 28,637 subadults); **Table 10.49**, see also **Table 2.14** in **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)**.

280. However, this is not accounted for in the calculation of the breeding season cumulative mortality, which is derived from all projects within the razorbill foraging range of the Bellrock WFDA (see Section 2.2.2 in **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV**). Most of these projects are closer to the coast than the Bellrock WFDA and so have potential connectivity with a much larger razorbill population. Nevertheless, the approach which is used assumes that all of the potential mortality from these projects during the breeding season is attributed to the small regional population that has been defined in relation to the Bellrock WFDA. This results in the PVA predicting a population effect substantially larger than can actually be the case.

281. The extent of the bias arising from the problem outlined above can be illustrated by comparing the predicted increase in razorbill mortality as determined for the assessment (i.e. in **Paragraph 275**, and Table 2.18 of **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV**) to that which would arise if the regional population was defined according to the maximum breeding season foraging range, as opposed to the mean maximum + 1 SD foraging range (i.e. 313 km instead of 122.2 km – Woodward et al. 2019). Such an approach has been adopted for the guillemot assessment on the basis of advice received from NatureScot, which resulted at least in part from the fact that the Bellrock WFDA is beyond the mean maximum + 1 SD of the breeding season foraging range of guillemot (**Table 10.2**). In the case of razorbill, the Bellrock WFDA is beyond the mean maximum + 1 SD of the razorbill foraging range for the vast majority of breeding colonies, so in this respect the difference with guillemot is subtle. Given this, it would seem reasonable to argue that an analogous approach to defining the regional breeding population could also be appropriate for razorbill.

282. If such an approach is adopted, the regional breeding population (based on the number of adults estimated at all colonies within the maximum foraging range of the Bellrock WFDA) increases from 26,583 (**Paragraph 279**) to 178,806. Including all projects within the maximum razorbill foraging range of the Bellrock WFDA (including Berwick Bank) also increases the cumulative adult mortality, from 497 birds to 1,693 birds (based on the maximum displacement rate, as set out in **Paragraph 275** and calculated using exactly the same approach as used for the assessment above – see **Paragraph 240** and **Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)**. This would give a percentage point increase in adult mortality of 0.9468 compared to a value of 1.8681 derived under the assessed scenario (**Paragraph 275**). In other words, the approach used for the assessment approximately doubles the predicted effect when compared to an approach which is less affected by a marked imbalance in the derivation of the size of the regional population and the sources of cumulative mortality attributed to that population.

283. UK population trends for razorbill documented by Burnell et al. (2023) indicate that this species has increased by 18% since 2000, continuing increases recorded during the latter half of the 20th Century. The post-2000 changes are not consistent between colonies, with increases most frequent in the south, with some declines in more northern colonies. On the east coast of Scotland populations have largely increased, with, for example, Banff & Buchan and Caithness increasing by 29% and 66% respectively.

284. The Shetland population, however, has declined by 66%, while Orkney is effectively unchanged. Overall, Scotland has shown a small decline (2%) since 2000 (Burnell et al. 2023). It is likely that razorbills are vulnerable to the same pressures as other species such as guillemot, such as prey availability, climate effects (including extreme weather events) and anthropogenic factors, such as oil spills and fishery impacts (Burnell et al. 2023), and such impacts may explain declines, where these have occurred.

285. It seems unlikely that offshore wind farms are currently a significant pressure on razorbill populations, and while there is some uncertainty about the cumulative effects of offshore wind development on razorbills, it is considered unlikely that this would have a measurable impact on the overall population trend for this species.

286. During the 15-year recovery period following the Bellrock Wind Farm Infrastructure's operational life, the PVA indicates that there would be a slight recovery in the counterfactual growth rate, although no recovery in population size is predicted for this period.

287. The cumulative impact is predicted to be of national spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, after which time the infrastructure would no longer contribute to cumulative effects, and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, as the PVA predicts potentially significant population effects (noting the caveats above), the magnitude of the impact is considered, on a precautionary basis, to be **medium**.

10.9.4.1.2.4 Puffin

288. **Table 10.51** sets out the puffin population at risk of displacement effects for each of the projects (including Berwick Bank Wind Farm; refer to **Paragraph 239**) considered for the cumulative assessment for this species.

289. In total, 73,026 puffins are considered to be at risk of displacement across all projects. Further information on the derivation of this estimate is provided in Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume VI)**, with the supporting data provided in Annex B, and summarised in **Paragraph 240** above.

Table 10.51: Estimate of Puffin Populations at Risk of Displacement for Projects Considered in the Cumulative Assessment

Wind Farm	Breeding	Non-breeding	Annual
Beatrice	2,858	2,435	5,293
Blyth Demonstration Site	235	123	358
Dudgeon	0	3	3
Aberdeen	42	82	124
Galloper	0	1	1
Greater Gabbard	0	1	1
Gunfleet Sands I & II	-	-	0
Humber Gateway	0	10	10
Hywind Scotland Pilot Park	119	85	204
Kentish Flats	-	-	0
Kentish Flats Extension	0	6	6
Lincs, Lynn & Inner Dowsing[1]	0	6	6
London Array	0	1	1
Methil	8	0	8
Race Bank	0	10	10
Rampion	0	0	0
Scroby Sands	-	-	0
Sheringham Shoal	0	26	26
Teesside	35	18	53
Thanet	0	0	0
Westermost Rough	0	35	35
East Anglia ONE	0	32	32
Hornsea 1	0	1,257	1,257
Hornsea 2	0	2,039	2,039
Moray East	2,795	656	3,451
Triton Knoll	0	71	71
Kincardine	19	0	19

Wind Farm	Breeding	Non-breeding	Annual
Dogger Bank A	37	295	332
Dogger Bank B	102	743	845
Dogger Bank C	34	273	307
East Anglia THREE	0	307	307
Inch Cape	2,956	2,688	5,644
Moray West	1,115	3,966	5,081
Neart na Gaoithe	2,562	2,103	4,665
Seagreen Alpha[2]	2,572	1,526	4,098
Seagreen Bravo[2]	3,582	3,863	7,445
Sofia	35	329	364
Hornsea 3	0	67	67
Norfolk Boreas	0	23	23
Norfolk Vanguard	0	112	112
East Anglia ONE North	-	-	0
East Anglia TWO	0	0	0
Hornsea 4	0	442	442
Dudgeon Extension	0	46	46
Sheringham Extension	0	18	18
Rampion 2	0	0	0
PFOWF	0	6	6
Green Volt	250	41	291
Berwick Bank	4,513	8,892	13,405
Outer Dowsing	0	696	696
Five Estuaries	0	0	0
Dogger Bank South	147	373	519
North Falls	0	1	1
West of Orkney	0	2,136	2,136
Salamander	1,679	422	2,101

Wind Farm	Breeding	Non-breeding	Annual
Cenos	221	16	237
Ossian	1,928	1,178	3,106
Muir Mhòr	1,812	1,812	3,624
Caledonia	2,061	1,336	3,397
TOTAL excluding Bellrock WFDA	**31,717**	**40,605**	**72,322**
Bellrock WFDA	360	344	704
TOTAL including Bellrock WFDA	**32,076**	**40,949**	**73,026**

Notes:

[1] In the case of puffin, the source of the potential mortalities from displacement (APEM (2022) - Hornsea Project Four. Ornithology EIA & HRA Annex, Deadline: 6, Rev 03) gives the numbers for the Lincs, Lynn and Inner Dowsing wind farms as a combined total, and they are displayed as such in this table. This is unlike the other species which may have separate totals for Lincs, Lynn and Inner Dowsing.

[2] For this species data for Seagreen Alpha and Seagreen Bravo are presented separately in the NEEOG interim CEF. Together, these two projects are equivalent to Seagreen Phase 1 and Seagreen Phase 1A combined.

290. Assuming 60% displacement, 3% to 5% mortality of displaced birds in the breeding season and 1% to 3% of displaced birds in non-breeding seasons, the predicted cumulative mortality estimate is 577 to 962 in the breeding season, and 246 to 737 in the no-breeding period, or 823 to 1,699 birds annually. Assuming a regional population of 602,572 (**Table 10.16**), and an average annual mortality rate of 0.188 (**Table 10.21**), this is equivalent to an annual increase in background mortality of 0.73% to 1.50% (refer to **Table 10.52**).

Table 10.52: Estimated Cumulative Displacement Mortality for Puffin by Seasonal Period in Relation to Baseline Mortality

Season	Estimated Cumulative Seasonal Displacement Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality
Breeding	577 – 962	602,572	113,284	0.51% – 0.85%
Non-breeding	246 – 737	231,958	43,608	0.56% – 1.69%
Total	**823 – 1,699**	**602,572**	**113,284**	**0.73% – 1.50%**

Notes:

[1] Assumes an annual average mortality rate of 0.188 (**Table 10.21**).

291. A total annual mortality of 823 to 1,699 birds is equivalent to an annual mortality of 460 to 1,049 adult birds from the breeding population with connectivity to Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.1651 to 0.3765 (refer to Table 2.18 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report** (**Volume VI** for derivation of these values).

10.9.4.1.2.4.1 Population Viability Analysis

292. As the percentage point increase in the rate of baseline breeding adult mortality is above 0.02, PVA has been undertaken, in accordance with NatureScot guidance (NatureScot, 2023g). The PVA has been carried out considering a range of displacement and mortality rates. The results of the PVAs for predicted cumulative displacement impacts (including Berwick Bank; refer to **Paragraph 239**) for the puffin regional SPA population over the 35-year operational life of the Bellrock Wind Farm Infrastructure and 15 years post-operation recovery period is summarised in **Table 10.53**. Further details of the PVA methodology, input parameters and an explanation of how to interpret the PVA results can be found in **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume VI**.

Table 10.53: Population Viability Analysis for Predicted Cumulative Displacement Mortality for Puffin

Projection Period	Impact Scenario	Median Population Size	Annual Growth Rate (Median)	Median CPGR	Median CPS
35 years	**Baseline (no impact)**	**787,048**	**1.0249**	**N/A**	**N/A**
	Displacement lower	742,745	1.0233	0.9984	0.9437
	Displacement upper	695,199	1.0214	0.9966	0.8836
50 years	**Baseline (no impact)**	**1,143,303**	**1.0248**	**N/A**	**N/A**
	Displacement lower	1,079,708	1.0237	0.9989	0.9441
	Displacement upper	1,012,747	1.0223	0.9976	0.8845

293. During the 35-year operational life of the Bellrock Wind Farm Infrastructure, the puffin regional population is predicted to increase under the unimpacted scenario. Under both the lower and upper estimates of displacement mortality, the population is still predicted to increase, with only a very small reduction in growth rate (99.84% and 99.66%) and population size (94.37% and 88.36%) relative to the unimpacted population. These values indicate that the PVA did not predict a significant negative effect from the cumulative effects of displacement mortality on the puffin regional breeding population after 35 years.

294. In addition, as outlined in **Section 10.9**, these outputs include the potential effects from the Berwick Bank Wind Farm, although to a large extent the effects from the Berwick Bank Wind Farm on the regional puffin population will be offset by the compensation that is required in relation to those SPA puffin populations for which adverse effects were concluded (**Bellrock WFDA RIAA: Part 3**, **(Volume VI)**). Thus, with the potential effects from the Berwick Bank Wind Farm excluded, the predicted reductions in annual population growth rate and end population size of the impacted population relative to the unimpacted population are only 99.87% to 99.72% and 95.28% to 90.33%, respectively (**Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)**).

295. While the assessment has not relied on the outputs that exclude the potential effects from Berwick Bank (i.e. the compensation that it would provide has not been used to reach the assessment conclusions), these results demonstrate that there is additional precaution in the assessment conclusions.

296. During the 15-year recovery period following the Bellrock Wind Farm Infrastructure's operational life, the PVA indicates that there would be a slight recovery in the counterfactual growth rate and population size, but this would remain slightly below the predicted rates under the unimpacted scenario. While this indicates that there would not be a complete recovery during the first 15 years of the post-operation recovery period, the differences are so small that it is unlikely they would be detectable at a population level.

297. The cumulative impact is predicted to be of national spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, after which time the infrastructure would no longer contribute to cumulative effects, and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, as the PVA does not predict significant population effects the magnitude of the impact is considered to be **low**.

10.9.4.1.2.5 Gannet

298. **Table 10.54** sets out the gannet population at risk of displacement effects for each of the projects (including Berwick Bank; refer to **Paragraph 239**) considered for the cumulative assessment for this species. In total, 70,959 gannets are considered to be at risk of displacement across all projects.

299. Further information on the derivation of this estimate is provided in Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume VI)**, with the supporting data provided in Annex B, and summarised in **Paragraph 240** above.

Table 10.54: Estimate of Gannet Populations at Risk of Displacement for Projects Considered in the Cumulative Assessment

Wind Farm	Autumn Passage	Spring Passage	Breeding Season	Annual
Greater Gabbard	69	105	0	174
Gunfleet Sands I & II	12	9	0	21
Kentish Flats	-	-	0	0
Kentish Flats Extension	13	0	0	13
Lincs	-	-	-	0
London Array	-	-	0	0
Lynn & Inner Dowsing[1]	-	-	-	0
Scroby Sands	-	-	-	0
Sheringham Shoal	31	2	47	80
Teesside	0	0	1	1
Thanet	-	-	0	0
Humber Gateway	-	-	-	0
Westermost Rough	-	-	-	0
Hywind	0	4	10	14
Kincardine	0	0	120	120
Beatrice	0	0	151	151
Blyth Demo	-	-	-	0
Dogger Bank A & B[1]	2,048	394	1,155	3,597
Dudgeon	25	11	53	89
East Anglia ONE	3,638	76	0	3,714
Aberdeen	5	0	35	40
Galloper	907	276	0	1,183
Hornsea 1	694	250	671	1,615
Methil	0	0	23	23
Moray East	292	27	564	883
Race Bank	32	29	92	153

Wind Farm	Autumn Passage	Spring Passage	Breeding Season	Annual
Rampion	590	0	0	590
Dogger Bank C & Sofia[1]	887	464	2,250	3,601
Triton Knoll	15	24	211	250
Hornsea 2	1,140	124	457	1,721
East Anglia THREE	1,269	524	412	2,205
Moray West	439	144	2,827	3,410
Norfolk Boreas	1,723	526	1,229	3,478
East Anglia TWO	891	192	0	1,083
East Anglia ONE North	468	44	149	661
Norfolk Vanguard	2,453	437	271	3,161
Hornsea 3	984	524	1,333	2,841
Hornsea 4	790	401	976	2,167
Sheringham Extension & Dudgeon Extension [1]	638	57	440	1,135
Inch Cape	703	212	2,398	3,313
Neart na Gaoithe	552	281	1,987	2,820
Seagreen Phase 1 and 1A	664	332	2,956	3,952
PFOWF	24	8	166	198
Green Volt	24	102	198	324
Berwick Bank	1,500	269	4,735	6,504
West of Orkney	1,171	140	852	2,162
Salamander	363	9	442	813
Cenos	264	18	216	498
Ossian	775	42	1,393	2,210
Muir Mhòr	593	74	597	1,264
Caledonia	315	29	909	1,253
Rampion 2	102	123	0	225

Wind Farm	Autumn Passage	Spring Passage	Breeding Season	Annual
Five Estuaries	657	102	0	759
Outer Dowsing	496	283	554	1,333
North Falls	287	196	0	483
Dogger Bank South	1,574	900	1,560	4,034
TOTAL excluding Bellrock WFDA	**30,115**	**7,763**	**32,440**	**70,318**
Bellrock WFDA	224	159	258	641
TOTAL including Bellrock WFDA	**30,338**	**7,922**	**32,699**	**70,959**

Notes:

[1] In the case of gannet, one of the source documents of the potential mortalities from displacement (MacArthur Green and RHDHV (2021) - East Anglia TWO and East Anglia ONE North Offshore Windfarms. Deadline 11 Offshore ornithology cumulative and in-combination collision risk and displacement update. Document Reference: ExA.AS-3.D11.V1) gives the numbers for a variety of OWFs as combined totals, these are generally partner and/or directly adjoining projects.

300. Assuming 70% displacement and 1% to 3% mortality of displaced birds, the predicted cumulative mortality estimate is 229 to 687 in the breeding season, 212 to 637 in the autumn migration season and 55 to 166 in the spring migration season, or 497 to 1,490 birds annually. Assuming a regional population of 690,990 (**Table 10.16**), and an average annual mortality rate of 0.187 (**Table 10.21**), this is equivalent to an annual increase in background mortality of 0.38% to 1.15% (refer to **Table 10.55**).

Table 10.55: Estimated Cumulative Displacement Mortality for Gannet by Seasonal Period in Relation to Baseline Mortality

Season	Estimated Cumulative Seasonal Displacement Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality
Breeding	229 – 687	690,990	129,215	0.18% – 0.53%
Autumn migration	212 – 637	456,298	85,328	0.25% – 0.75%
Spring migration	55 – 166	248,385	46,448	0.12% – 0.36%
Total	**497 – 1,490**	**690,990**	**129,215**	**0.38% – 1.15%**

Notes:

[1] Assumes an annual average mortality rate of 0.157 (**Table 10.21**)

301. A total annual mortality of 497 to 1,490 birds is equivalent to an annual mortality of 342 to 1,027 adult birds from the breeding population with connectivity to Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.0902 to 0.2705 (refer to Table 2.18 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume VI)** for derivation of these values).

10.9.4.1.2.5.1 Population Viability Analysis

302. As the percentage point increase in the rate of baseline breeding adult mortality is above 0.02, PVA has been undertaken, in accordance with NatureScot guidance (NatureScot, 2023g). The PVA has been carried out considering a range of displacement and mortality rates. The results of the PVAs for predicted cumulative displacement impacts (including Berwick Bank; refer to **Paragraph 239**) for the gannet regional SPA population over the 35-year operational life of the Bellrock Wind Farm Infrastructure and 15 years post-operation recovery period is summarised in **Table 10.56**. Further details of the PVA methodology, input parameters and an explanation of how to interpret the PVA results can be found in **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume VI)**.

Table 10.56: Population Viability Analysis for Predicted Cumulative Displacement Mortality for Gannet

Projection Period	Impact scenario	Median population size	Annual Growth Rate (Median)	Median CPGR	Median CPS
35 years	**Baseline (no impact)**	**492,472**	**1.0061**	**N/A**	**N/A**
	Displacement lower	477,401	1.0052	0.9991	0.9695
	Displacement upper	448,805	1.0035	0.9974	0.9114
50 years	**Baseline (no impact)**	**541,073**	**1.0061**	**N/A**	**N/A**
	Displacement lower	524,457	1.0055	0.9994	0.9696
	Displacement upper	493,165	1.0043	0.9982	0.9117

303. During the 35-year operational life of the Bellrock Wind Farm Infrastructure, the gannet regional population is predicted to increase under the unimpacted scenario. Under both the lower and upper estimates of displacement mortality, the population is still predicted to increase, with only a very small reduction in growth rate (99.91% and 99.74%) and population size (96.95% and 91.14%) relative to the unimpacted population. These values indicate that the PVA did not predict a significant negative effect from the cumulative effects of displacement mortality on the gannet regional breeding population after 35 years.

304. In addition, as outlined in **Section 10.9**, these outputs include the potential effects from the Berwick Bank Wind Farm, although to a large extent the effects from the Berwick Bank Wind Farm on the regional gannet population will be offset by the compensation that is required in relation to those SPA gannet populations for which adverse effects were concluded (**Bellrock WFDA RIAA: Part 3 (Volume VI)**). Thus, with the potential effects from the Berwick Bank Wind Farm excluded, the predicted reductions in annual population growth rate and end population size of the impacted population relative to the unimpacted population are only 99.92% to 99.77% and 97.23% to 91.93%, respectively (**Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)**). While the assessment has not relied on the outputs that exclude the potential effects from Berwick Bank (i.e. the compensation that it would provide has not been used to reach the assessment conclusions), these results demonstrate that there is additional precaution in the assessment conclusions.

305. During the 15-year recovery period following the Bellrock Wind Farm Infrastructure's operational life, the PVA indicates that there would be a slight recovery in the counterfactual growth rate and population size, but this would remain slightly below the predicted rates under the unimpacted scenario. While this indicates that there would not be a complete recovery during the first 15 years of the post-operation recovery period, the differences are so small that it is unlikely they would be detectable at a population level.

306. The cumulative impact is predicted to be of national spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, after which time the infrastructure would no longer contribute to cumulative effects, and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, as the PVA does not predict significant population effects the magnitude of the impact is considered to be **low**.

10.9.4.1.3 Significance of Cumulative Effect

307. For **kittiwake, guillemot, puffin and gannet**, sensitivity is **medium,** and the magnitude of impact is **low**. The effect is therefore of **minor adverse** significance, which is **not significant** in EIA terms.

308. For razorbill sensitivity is **medium** and the magnitude of impact is **medium**. The effect is, therefore, of **moderate adverse** significance, which **is significant** in EIA terms. However, it is noted that the contribution of the Bellrock WFDA to the cumulative total is very small, **representing less than 1% of predicted mortality across all projects**, and also that the assessment approach will (probably substantially) overestimate the actual effect on this species, as set out in **Paragraphs 278** to **282**. It is also noted that the Bellrock Project has proposed compensation, either on an agreed or without prejudice basis, which would address potential effects on a number of razorbill SPA colonies connected to the Bellrock WFDA (**Bellrock WFDA Shadow Habitats Regulations Derogation Case (Volume VI)**.

10.9.4.2 Impact O5: Collision with WTGs

309. The Bellrock WFDA alone assessment has considered the effects of collision on five seabird species; kittiwake, great black-backed gull, Arctic tern, Arctic skua and gannet. Further information on this impact pathway is provided in **Section 10.8.2.5**. For three of these species (great black-backed gull, Arctic tern and Arctic skua) the Bellrock Wind Farm Infrastructure -

alone mortality is considered so small (**Section 10.8.2.5**) that it would make no meaningful contribution to cumulative effects. These species have not, therefore, been considered further in the cumulative assessment. For the remaining two species (kittiwake and gannet), while the magnitude of impact is considered small (i.e. minor adverse) as a result of the Bellrock Wind Farm Infrastructure alone, the predicted mortality could contribute to cumulative effects with other projects. These species have therefore been considered in the cumulative assessment.

10.9.4.2.1 Sensitivity

310. Kittiwake and gannet are considered to have **medium** sensitivity to collision (refer to **Section 10.8.2.5.1**).

10.9.4.2.2 Magnitude of Cumulative Impact

10.9.4.2.2.1 Kittiwake

311. **Table 10.57** sets out the predicted collision mortality for each of the projects considered for the cumulative assessment for this species (including Berwick Bank; refer to **Paragraph 239**). Further information on the derivation of this estimate is provided in Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)**, with the supporting data provided in Annex B, and summarised in **Paragraph 240** above.

312. The predicted cumulative mortality estimate is 1,503 in the breeding season, 858 in the autumn migration season and 895 in the spring migration season, or 3,256 birds annually. Assuming a regional population of 829,937 (**Table 10.16**), and an average annual mortality rate of 0.157 (**Table 10.21**), this is equivalent to an annual increase in background mortality of 2.5% (refer to **Table 10.58**).

Table 10.57: Estimate of Kittiwake Collision Mortality for Projects Considered in the Cumulative Assessment

Wind Farm	Autumn Passage	Spring Passage	Breeding Season	Annual
Greater Gabbard	8.69	7.25	0.00	15.95
Gunfleet Sands	0.00	0.00	0.00	0.00
Kentish Flats	0.52	0.45	0.00	0.97
Kentish Flats Ext	0.00	1.40	0.00	1.40
Lincs	0.70	0.45	0.00	1.14
London Array	0.51	0.44	0.00	0.95
Lynn & Inner Dowsing	0.00	0.00	0.00	0.00
Scroby Sands	0.00	0.00	0.00	0.00
Sheringham Shoal	0.00	0.00	0.00	0.00
Teesside	11.75	1.34	26.76	39.85

Wind Farm	Autumn Passage	Spring Passage	Breeding Season	Annual
Thanet	0.13	0.12	0.00	0.25
Humber Gateway	0.79	0.52	0.00	1.31
Westermost Rough	0.12	0.06	0.00	0.18
Hywind	0.52	0.57	12.21	13.31
Kincardine	5.22	0.64	17.42	23.27
Beatrice	3.41	13.94	40.76	58.11
Blyth Demo	1.33	0.89	1.70	3.93
Dogger Bank A & B	78.25	187.98	256.68	522.91
Dudgeon	0.00	0.00	0.00	0.00
East Anglia ONE	62.72	20.09	0.00	82.82
Aberdeen	2.57	0.54	7.29	10.40
Galloper	6.77	8.51	0.00	15.28
Hornsea 1	5.63	2.31	0.00	7.94
Methil	0.00	0.00	0.40	0.40
Moray East	1.45	3.64	17.45	22.55
Race Bank	8.16	2.10	0.00	10.26
Rampion	14.84	12.94	0.00	27.79
Dogger Bank C & Sofia	52.57	138.03	132.67	323.27
Triton Knoll	29.26	10.49	0.00	39.75
Hornsea 2	5.22	1.91	0.00	7.13
East Anglia THREE	32.81	19.54	0.00	52.34
Moray West	16.73	5.09	56.00	77.82
Norfolk Boreas	23.42	8.65	0.00	32.07
East Anglia TWO	3.93	5.38	0.00	9.31
East Anglia ONE North	5.89	2.55	0.00	8.44
Norfolk Vanguard	11.93	14.04	0.00	25.96
Hornsea 3	27.98	22.30	0.00	50.28

Wind Farm	Autumn Passage	Spring Passage	Breeding Season	Annual
Hornsea 4	10.11	3.35	54.18	67.64
Sheringham Extension & Dudgeon Extension	4.30	0.90	0.00	5.20
Inch Cape	18.91	4.36	29.09	52.36
Neart na Gaoithe	12.36	1.45	5.82	19.64
Seagreen Phase 1 and 1A	103.50	56.40	92.46	252.36
Berwick Bank (Scoping Approach)	138.18	130.18	448.73	717.09
PFOWF	0.73	0.00	0.00	0.73
Green Volt	5.95	3.55	5.65	15.15
West of Orkney	16.31	21.87	0.00	38.18
Salamander	0.00	0.00	14.00	14.00
Cenos	3.00	2.05	8.05	13.10
Ossian	5.35	6.24	28.13	39.72
Muir Mhòr	0.95	8.35	60.11	69.40
Caledonia	6.99	4.75	55.27	67.01
Rampion 2	9.78	17.25	0.00	27.03
Five Estuaries	7.88	12.16	0.00	20.04
North Falls	3.64	11.20	0.00	14.84
Outer Dowsing	3.03	13.81	0.00	16.84
Dogger Bank South	79.32	99.84	120.78	299.94
TOTAL excluding Bellrock WFDA	**854.12**	**891.85**	**1491.62**	**3237.59**
Bellrock WFDA	4.26	2.87	11.74	18.87
TOTAL including Bellrock WFDA	**858.38**	**894.72**	**1503.36**	**3256.46**

Table 10.58: Estimated Cumulative Collision Mortality for Kittiwake by Seasonal Period in Relation to Baseline Mortality

Season	Estimated Cumulative Seasonal Collision Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality
Breeding	1,503.36	686,236	107,739	1.40%
Autumn migration	858.38	829,937	130,300	0.66%
Spring migration	894.72	627,816	98,567	0.91%
Total	3,256.46	829,937	130,300	2.50%

Notes:

[1] Assumes an annual average mortality rate of 0.157 (**Table 10.21**).

313. A total annual mortality of 3,256 birds is equivalent to an annual mortality of 1,935 adult birds from the breeding population with connectivity to Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.6181 (refer to Table 2.19 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume VI)** for derivation of these values.

10.9.4.2.2.1.1 Population Viability Analysis

314. As the percentage point increase in the rate of baseline breeding adult mortality is above 0.02, PVA has been undertaken, in accordance with NatureScot guidance (NatureScot, 2023g). The results of the PVA for predicted cumulative collision mortality (including Berwick Bank; refer to **Paragraph 239**) for the kittiwake regional SPA population over the 35-year operational life of the Bellrock Wind Farm Infrastructure and 15 years post-operation recovery period is summarised in **Table 10.59**.

315. Further details of the PVA methodology, input parameters and an explanation of how to interpret the PVA results can be found in **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)**.

Table 10.59: Population Viability Analysis for Predicted Cumulative Collision Mortality for Kittiwake

Projection Period	Impact Scenario	Median Population Size	Annual Growth Rate (Median)	Median CPGR	Median CPS
35 years	**Baseline (no impact)**	**1,296,943**	**1.034**	**N/A**	**N/A**
	Collision mortality	1,070,772	1.028	0.995	0.825
50 years	**Baseline (no impact)**	**2,130,223**	**1.034**	**N/A**	**N/A**
	Collision mortality	1,761,918	1.030	0.996	0.826

316. During the 35-year operational life of the Bellrock Wind Farm Infrastructure, the kittiwake regional population is predicted to increase under the unimpacted scenario. Under the impacted scenario, the population is still predicted to increase, with only a very small reduction in growth rate (99.5%) and population size (82.5%) relative to the unimpacted population. These values indicate that the PVA did not predict a significant negative effect from the cumulative effects of collision mortality on the kittiwake regional breeding population after 35 years.

317. In addition, as outlined in **Section 10.9**, these outputs include the potential effects from the Berwick Bank Wind Farm, although to a large extent the effects from the Berwick Bank Wind Farm on the regional kittiwake population will be offset by the compensation that is required in relation to those SPA kittiwake populations for which adverse effects were concluded (**Bellrock WFDA RIAA: Part 3 (Volume VI)**). Thus, with the potential effects from the Berwick Bank Wind Farm excluded, the predicted reductions in annual population growth rate and end population size of the impacted population relative to the unimpacted population are only 99.6% and 86.2%, respectively (**Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)**). While the assessment has not relied on the outputs that exclude the potential effects from Berwick Bank (i.e. the compensation that it would provide has not been used to reach the assessment conclusions), these results demonstrate that there is additional precaution in the assessment conclusions.

318. During the 15-year recovery period following the Bellrock Wind Farm Infrastructure's operational life, the PVA indicates that there would be a slight recovery in the counterfactual growth rate and population size, but this would remain slightly below the predicted rates under the unimpacted scenario. While this indicates that there would not be a complete recovery during the first 15 years of the post-operation recovery period, the differences are so small that it is unlikely they would be detectable at a population level.

319. UK population trends for kittiwake documented by Burnell et al. (2023) indicate that this species has declined, with a 42% reduction in population since 2000. Effects in more northerly latitudes have been particularly marked, with declines of 80% and 89% reported from Shetland and Orkney respectively. Colonies on the east coast of Scotland have also shown substantial decline, with, for example, Caithness and Kincardine & Deeside showing declines of 42% and

47% respectively. However, it is not considered that offshore wind farms are a significant factor in this decline, which is mainly attributed to factors such as prey availability, local predation pressure and extreme weather events (Burnell et al. 2023), (Furness and Tasker, 2000), (Frederiksen et al. 2008) and (Carroll et al. 2017). The cumulative effects of offshore wind development are therefore unlikely to have a measurable impact on the overall population trend for this species.

320. The cumulative impact is predicted to be of national spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, after which time the infrastructure would no longer contribute to cumulative effects, and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, as the PVA does not predict significant population effects the magnitude of the impact is considered to be **low**.

10.9.4.2.2.2 Gannet

321. **Table 10.60** sets out the predicted collision mortality for each of the projects considered for the cumulative assessment for this species. Further information on the derivation of this estimate is provided in Section 2.2.2 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)**, with the supporting data provided in Annex B, and summarised in **Paragraph 240** above.

Table 10.60: Estimate of Gannet Collision Mortality for Projects Considered in the Cumulative Assessment

Wind Farm	Autumn Passage	Spring Passage	Breeding Season	Annual
Greater Gabbard	1.23	0.87	0.00	2.11
Gunfleet Sands	-	-	-	-
Kentish Flats	0.44	0.78	0.00	1.22
Kentish Flats Ext	-	-	0.00	0.00
Lincs	0.63	1.48	1.93	4.04
London Array	0.27	0.63	0.00	0.90
Lynn & Inner Dowsing	0.07	0.17	0.26	0.50
Scroby Sands	-	-	-	-
Sheringham Shoal	2.20	0.00	14.30	16.50
Teesside	0.17	0.00	2.72	2.88
Thanet	0.00	0.00	0.00	0.00
Humber Gateway	0.08	0.14	0.87	1.09
Westermost Rough	0.01	0.03	0.15	0.19

Wind Farm	Autumn Passage	Spring Passage	Breeding Season	Annual
Hywind	0.12	0.15	4.34	4.61
Kincardine	0.00	0.00	2.18	2.18
Beatrice	4.33	1.09	24.17	29.59
Blyth Demo	0.31	0.53	3.31	4.15
Dogger Bank A & B	12.21	10.33	84.17	106.70
Dudgeon	2.63	1.68	12.64	16.94
East Anglia ONE	12.97	0.81	0.00	13.78
Aberdeen	0.62	0.02	3.49	4.12
Galloper	1.96	1.04	0.00	2.99
Hornsea 1	1.06	0.97	4.13	6.16
Methil	0.00	0.00	6.00	6.00
Moray East	5.17	1.69	67.96	74.82
Race Bank	0.91	0.42	14.78	16.10
Rampion	6.42	0.28	0.00	6.70
Dogger Bank C & Sofia	1.48	2.05	14.21	17.74
Triton Knoll	3.28	2.00	13.22	18.50
Hornsea 2	2.05	1.14	9.02	12.20
East Anglia THREE	4.17	1.59	11.20	16.96
Moray West	0.33	0.15	7.13	7.61
Norfolk Boreas	2.77	0.85	10.25	13.88
East Anglia TWO	5.04	0.87	0.00	5.91
East Anglia ONE North	2.40	0.24	9.02	11.66
Norfolk Vanguard	4.06	1.16	5.96	11.18
Hornsea 3	0.98	1.07	7.10	9.16
Hornsea 4	1.13	0.28	11.49	12.91
SEP & DEP	0.60	0.00	0.50	1.10
Inch Cape	1.09	0.87	78.55	80.51

Wind Farm	Autumn Passage	Spring Passage	Breeding Season	Annual
Neart na Gaoithe	1.53	1.53	64.73	67.78
Seagreen Phase 1 and 1A	3.09	3.55	208.42	215.06
PFOWF	0.00	0.00	1.45	1.45
Green Volt	0.18	0.72	14.50	15.40
Berwick Bank (Scoping)	3.93	0.65	123.64	128.22
West of Orkney	2.32	0.61	35.29	38.22
Salamander	0.60	0.15	6.50	7.25
Cenos	0.96	0.38	17.15	18.49
Ossian	1.13	0.07	28.18	29.38
Muir Mhòr	0.69	0.14	9.84	10.66
Caledonia	0.59	0.08	12.35	13.02
Rampion2	1.41	0.61	0.00	2.02
Five Estuaries	2.26	0.31	0.00	2.57
Outer Dowsing	0.42	0.14	1.09	1.65
North Falls	0.89	0.68	0.00	1.57
Dogger Bank South	3.72	0.57	7.95	12.24
TOTAL excluding Bellrock WFDA	**106.89**	**45.58**	**956.12**	**1,108.59**
Bellrock WFDA	2.46	0.6	14.77	17.83
TOTAL including Bellrock WFDA	**109.35**	**46.18**	**970.89**	**1,126.42**

322. The predicted cumulative mortality estimate is 971 in the breeding season, 109 in the autumn migration season and 46 in the spring migration season, or 1,126 birds annually. Assuming a regional population of 690,990 (**Table 10.16**), and an average annual mortality rate of 0.187 (**Table 10.21**), this is equivalent to an annual increase in background mortality of 0.87% (refer to **Table 10.61**).

Table 10.61: Estimated Cumulative Collision Mortality for Gannet by Seasonal Period in Relation to Baseline Mortality

Season	Estimated Cumulative Seasonal Collision Mortality	Regional Baseline Population	Annual Regional Baseline Mortality	Increase in Baseline Mortality (%)
Breeding	970.89	690,990	129,215	0.75%
Autumn migration	109.35	456,298	85,328	0.13%
Spring migration	46.18	248,385	46,448	0.10%
Total	**1126.42**	**690,990**	**129,215**	**0.87%**
Notes: [1] Assumes an annual average mortality rate of 0.187 (**Table 10.21**).				

323. A total annual mortality of 1,126 birds is equivalent to an annual mortality of 908 adult birds from the breeding population with connectivity to Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.2390 (refer to Table 2.19 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)** for derivation of these values).

10.9.4.2.2.2.1 Population Viability Analysis

324. As the percentage point increase in the rate of baseline breeding adult mortality is above 0.02, PVA has been undertaken, in accordance with NatureScot guidance (NatureScot, 2023g). The results of the PVA for predicted cumulative collision mortality (including Berwick Bank; refer to **Paragraph 239**) for the gannet regional SPA population over the 35-year operational life of the Bellrock Wind Farm Infrastructure and 15 years post-operation recovery period is summarised in **Table 10.62**. Further details of the PVA methodology, input parameters and an explanation of how to interpret the PVA results can be found in **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)**.

Table 10.62: Population Viability Analysis for Predicted Cumulative Collision Mortality for Gannet

Projection Period	Impact Scenario	Median Population Size	Annual Growth Rate (Median)	Median CPGR	Median CPS
35 years	**Baseline (no impact)**	**492,472**	**1.0061**	**N/A**	**N/A**
	Collision mortality	458,633	1.0041	0.9980	0.9315
50 years	**Baseline (no impact)**	**541,073**	**1.0061**	**N/A**	**N/A**
	Collision mortality	504,395	1.0047	0.9986	0.9323

325. During the 35-year operational life of the Bellrock Wind Farm Infrastructure, the gannet regional population is predicted to increase under the unimpacted scenario. Under the impacted scenario, the population is still predicted to increase, with only a very small reduction in growth rate (99.80%) and population size (93.15%) relative to the unimpacted population. These values indicate that the PVA did not predict a significant negative effect from the cumulative effects of collision mortality on the gannet regional breeding population after 35 years.

326. In addition, as outlined in **Section 10.9**, these outputs include the potential effects from the Berwick Bank Wind Farm, although to a large extent the effects from the Berwick Bank Wind Farm on the regional gannet population will be offset by the compensation that is required in relation to those SPA gannet populations for which adverse effects were concluded (**Bellrock WFDA RIAA: Part 3 (Volume VI)**). Thus, with the potential effects from the Berwick Bank Wind Farm excluded, the predicted reductions in annual population growth rate and end population size of the impacted population relative to the unimpacted population are only 99.83% and 93.90%, respectively (**Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV**). While the assessment has not relied on the outputs that exclude the potential effects from Berwick Bank (i.e. the compensation that it would provide has not been used to reach the assessment conclusions), these results demonstrate that there is additional precaution in the assessment conclusions.

327. During the 15-year recovery period following the Bellrock Wind Farm Infrastructure's operational life, the PVA indicates that there would be a slight recovery in the counterfactual growth rate and population size, but this would remain slightly below the predicted rates under the unimpacted scenario. While this indicates that there would not be a complete recovery during the first 15 years of the post-operation recovery period, the differences are so small that it is unlikely they would be detectable at a population level.

328. The cumulative impact is predicted to be of national spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Fam Infrastructure, after which time the infrastructure would no longer contribute to cumulative effects, and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, as the PVA does not predict significant population effects the magnitude of the impact is considered to be **low**.

10.9.4.2.3 Significance of Cumulative Effect

329. For kittiwake, and gannet, sensitivity is **medium,** and the magnitude of impact is **low**. The effect is therefore of **minor adverse** significance, which is **not significant** in EIA terms.

10.9.4.3 Impact O6: Combined Collision and Displacement

330. As for the Bellrock WFDA alone assessment, the combined cumulative effects of collision and displacement have been considered for two species; kittiwake and gannet.

10.9.4.3.1 Sensitivity

331. Both kittiwake and gannet have been assessed as having **medium** sensitivity to displacement (**Section 10.8.2.3.1**) and **medium** sensitivity to collision risk (**Section 10.8.2.5.1**). Overall, therefore, both species are assumed (on a worst-case basis) to have **medium** sensitivity to the combined effects of displacement and collision.

10.9.4.3.2 Magnitude of Cumulative Impact

10.9.4.3.2.1 Kittiwake

332. **Table 10.63** sets out the predicted combined displacement and collision mortality, derived from the values presented in **Sections 10.9.4.1.2.1** and **10.9.4.2.2.1** respectively.

Table 10.63: Estimate of Combined Cumulative Kittiwake Displacement and Collision Mortality

Impact	Autumn Passage	Spring Passage	Breeding Season	Annual
Displacement (lower)	272	243	247	762
Displacement (upper)	816	729	741	2,286
Collision	858	895	1,503	3,256
Combined displacement and collision (lower)	**1,130**	**1,138**	**1,750**	**4,018**
Combined displacement and collision (upper)	**1,674**	**1,624**	**2,245**	**5,542**

333. The predicted cumulative mortality estimate (including Berwick Bank; refer to **Paragraph 239**) is 1,750 to 2,245 in the breeding season, 1,130 to 1,674 in the autumn migration season and 1,138 to 1,624 in the spring migration season, or 4,018 to 5,542 birds annually. Assuming a regional population of 829,937 (**Table 10.16**), and an average annual mortality rate of 0.157 (**Table 10.21**), this is equivalent to an annual increase in background mortality of 3.08% to 4.25% (refer to **Table 10.64**).

Table 10.64: Estimated Cumulative Displacement and Collision Mortality for Kittiwake by Seasonal Period in Relation to Baseline Mortality

Season	Estimated Seasonal Displacement Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality
Breeding	1,750 – 2,245	686,236	107,739	1.62% – 2.08%
Autumn migration	1,130 – 1,674	829,937	130,300	0.87% – 1.28%
Spring migration	1,138 – 1,624	627,816	98,567	1.15% – 1.65%
Total	**4,018 – 5,542**	**829,937**	**130,300**	**3.08% – 4.25%**
Notes: [1] Assumes an annual average mortality rate of 0.157 (**Table 10.21**).				

334. A total annual mortality of 4,018 to 5,542 birds is equivalent to an annual mortality of 2,350 to 3,181 adult birds from the breeding population with connectivity to Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.7507 to 1.0159. Further information on the derivation of this estimate is provided in Table 2.20 of **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)**, with the supporting data provided in Annex B, and summarised in **Paragraph 240** above.

10.9.4.3.2.1.1 Population Viability Analysis

335. As the percentage point increase in the rate of baseline breeding adult mortality is above 0.02, PVA has been undertaken, in accordance with NatureScot guidance (NatureScot, 2023g). The results of the PVA for predicted cumulative displacement and collision mortality (including Berwick Bank; refer to **Paragraph 239**) for the kittiwake regional SPA population over the 35-year operational life of the Bellrock Wind Farm Infrastructure and 15 years post-operation recovery period is summarised in **Table 10.65**. Further details of the PVA methodology, input parameters and an explanation of how to interpret the PVA results can be found in **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)**.

Table 10.65: Population Viability Analysis for Predicted Cumulative Displacement and Collision Mortality for Kittiwake

Projection Period	Impact Scenario	Median Population Size	Annual Growth Rate (Median)	Median CPGR	Median CPS
35 years	**Baseline (no impact)**	1,296,943	1.034	**N/A**	**N/A**
	Displacement lower and collision	1,022,949	1.027	0.993	0.789
	Displacement upper and collision	938,943	1.025	0.991	0.723
50 years	**Baseline (no impact)**	2,130,223	1.034	**N/A**	**N/A**
	Displacement lower and collision	1,683,087	1.029	0.995	0.791
	Displacement upper and collision	1,541,777	1.027	0.994	0.725

336. During the 35-year operational life of the Bellrock Wind Farm Infrastructure, the kittiwake regional population is predicted to increase under the unimpacted scenario. Under the impacted scenario, the population is still predicted to increase, with only a small reduction in growth rate (99.3% to 99.1%) and population size (78.9% to 72.3%) relative to the unimpacted population.

These values indicate that the PVA did not predict a significant negative effect from the cumulative effects of displacement and collision mortality on the kittiwake regional breeding population after 35 years.

337. In addition, as outlined in **Section 10.9**, these outputs include the potential effects from the Berwick Bank Wind Farm, although to a large extent the effects from the Berwick Bank Wind Farm on the regional kittiwake population will be offset by the compensation that is required in relation to those SPA kittiwake populations for which adverse effects were concluded (**Bellrock WFDA RIAA: Part 3**, **(Volume VI)**). Thus, with the potential effects from the Berwick Bank Wind Farm excluded, the predicted reductions in annual population growth rate and end population size of the impacted population relative to the unimpacted population are only 99.5% to 99.3% and 83.2% to 77.4%, respectively (**Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)**). While the assessment has not relied on the outputs that exclude the potential effects from Berwick Bank (i.e. the compensation that it would provide has not been used to reach the assessment conclusions), these results demonstrate that there is additional precaution in the assessment conclusions.

338. During the 15-year recovery period following the Bellrock Wind Farm Infrastructure's operational life, the PVA indicates that there would be a slight recovery in the counterfactual growth rate and population size, but this would remain slightly below the predicted rates under the unimpacted scenario. While this indicates that there would not be a complete recovery during the first 15 years of the post-operational life, the differences are so small that it is unlikely they would be detectable at a population level.

339. UK population trends for kittiwake documented by Burnell et al. (2023) indicate that this species has declined, with a 42% reduction in UK population since 2000. Effects in more northerly latitudes have been particularly marked, with declines of 80% and 89% reported from Shetland and Orkney respectively. Colonies on the east coast of Scotland have also shown substantial decline, with, for example, Caithness and Kincardine & Deeside showing declines of 42% and 47% respectively. However, it is not considered that offshore wind farms are a significant factor in this decline, which is mainly attributed to factors such as prey availability, local predation pressure and extreme weather events (Burnell et al. 2023), (Furness and Tasker, 2000), (Frederiksen et al. 2008) and (Carroll et al. 2017). The cumulative effects of offshore wind development are therefore unlikely to have a measurable impact on the overall population trend for this species.

340. The cumulative impact is predicted to be of national spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, after which time the infrastructure would no longer contribute to cumulative effects, and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, as the PVA does not predict significant population effects the magnitude of the impact is considered to be **low**.

10.9.4.3.2.2 Gannet

341. **Table 10.66** sets out the predicted combined displacement and collision mortality (including Berwick Bank; refer to **Paragraph 239**), derived from the values presented in **Sections 10.9.4.1.2.5** and **10.9.4.2.2.2** respectively.

Table 10.66: Estimate of Combined Cumulative Gannet Displacement and Collision Mortality

Impact	Autumn Passage	Spring Passage	Breeding Season	Annual
Displacement (lower)	212	55	229	497
Displacement (upper)	637	166	687	1,490
Collision	109	46	971	1,126
Combined displacement and collision (lower)	**322**	**102**	**1,200**	**1,623**
Combined displacement and collision (upper)	**746**	**213**	**1,658**	**2,617**

342. The predicted cumulative mortality estimate is 1,200 to 1,658 in the breeding season, 322 to 746 in the autumn migration season and 102 to 213 in the spring migration season, or 1,623 to 2,617 birds annually. Assuming a regional population of 690,990 (**Table 10.16**), and an average annual mortality rate of 0.187 (**Table 10.21**), this is equivalent to an annual increase in background mortality of 1.26% to 2.02% (refer to **Table 10.67**).

Table 10.67: Estimated Cumulative Displacement and Collision Mortality for Gannet by Seasonal Period in Relation to Baseline Mortality

Season	Estimated Cumulative Seasonal Displacement and Collision Mortality	Regional Baseline Population	Annual Regional Baseline Mortality[1]	Increase in Baseline Mortality
Breeding	1,200 – 1,658	690,990	129,215	0.93% – 1.28%
Autumn migration	322 – 746	456,298	85,328	0.38% – 0.87%
Spring migration	102 – 213	248,385	46,448	0.22% – 0.46%
Total	**1,623 – 2,617**	**690,990**	**129,215**	**1.26% – 2.02%**

Notes:

[1] Assumes an annual average mortality rate of 0.187 (Table 10.21).

343. A total annual mortality of 1,623 to 2,617 birds is equivalent to an annual mortality of 1,250 to 1,935 adult birds from the breeding population with connectivity to Bellrock WFDA. This represents an annual percentage point increase in the rate of baseline mortality for the breeding adult population of 0.3292 to 0.5095. Further information on the derivation of this estimate is provided in Table 2.20 of **Appendix 10.4: Offshore Ornithology Population Viability**

Analysis Report (Volume IV), with the supporting data provided in Annex B, and summarised in **Paragraph 240** above.

10.9.4.3.2.2.1 Population Viability Analysis

344. As the percentage point increase in the rate of baseline breeding adult mortality is above 0.02, PVA has been undertaken, in accordance with NatureScot guidance (NatureScot, 2023g). The results of the PVA for predicted cumulative displacement and collision mortality for the gannet regional SPA population over the 35-year operational life of the Bellrock Wind Farm Infrastructure and 15 years post-operation recovery period is summarised in **Table 10.68**. Further details of the PVA methodology, input parameters and an explanation of how to interpret the PVA results can be found in **Appendix 10.4: Offshore Ornithology Population Viability Analysis Report (Volume IV)**.

Table 10.68: Population Viability Analysis for Predicted Cumulative Displacement and Collision Mortality for Gannet

Projection Period	Impact Scenario	Median Population Size	Annual Growth Rate (Median)	Median CPGR	Median CPS
35 years	**Baseline (no impact)**	**492,472**	**1.0061**	**N/A**	**N/A**
	Displacement lower and collision	444,756	1.0033	0.9972	0.9032
	Displacement upper and collision	417,853	1.0015	0.9955	0.8489
50 years	**Baseline (no impact)**	**541,073**	**1.0061**	**N/A**	**N/A**
	Displacement lower and collision	488,958	1.0041	0.9980	0.9041
	Displacement upper and collision	459,831	1.0029	0.9968	0.8500

345. During the 35-year operational life of the Bellrock Wind Farm Infrastructure, the gannet regional population is predicted to increase under the unimpacted scenario. Under the impacted scenario, the population is still predicted to increase, with only a very small reduction in growth rate (99.72% to 99.55%) and population size (90.32% to 84.89%) relative to the unimpacted population. These values indicate that the PVA did not predict a significant negative effect from the cumulative effects of displacement and collision mortality on the gannet regional breeding population after 35 years.

346. In addition, as outlined in **Section 10.9**, these outputs include the potential effects from the Berwick Bank Wind Farm, although to a large extent the effects from the Berwick Bank Wind Farm on the regional gannet population will be offset by the compensation that is required in relation to those SPA gannet populations for which adverse effects were concluded (**Bellrock WFDA RIAA: Part 3 (Volume VI)**). Thus, with the potential effects from the Berwick Bank Wind Farm excluded, the predicted reductions in annual population growth rate and end population

size of the impacted population relative to the unimpacted population are only 99.75% to 99.59% and 91.31% to 86.32%, respectively (**Appendix 10.4: Offshore Ornithology Population Viability Technical Report (Volume IV)**). While the assessment has not relied on the outputs that exclude the potential effects from Berwick Bank (i.e. the compensation that it would provide has not been used to reach the assessment conclusions), these results demonstrate that there is additional precaution in the assessment conclusions.

347. During the 15-year recovery period following the Bellrock Wind Farm Infrastructure's operational life, the PVA indicates that there would be a slight recovery in the counterfactual growth rate and population size, but this would remain slightly below the predicted rates under the unimpacted scenario. While this indicates that there would not be a complete recovery during the first 15 years of the post-operation recovery period, the differences are so small that it is unlikely they would be detectable at a population level.

348. The cumulative impact is predicted to be of national spatial extent. The impact is expected to occur for the operational life of the Bellrock Wind Farm Infrastructure, after which time the infrastructure would no longer contribute to cumulative effects, and is therefore considered to be of long-term duration. It is predicted that the impact will affect the receptor directly. However, as the PVA does not predict significant population effects the magnitude of the impact is considered to be **low**.

10.9.4.3.3 Significance of Cumulative Effect

349. For **kittiwake, and gannet**, sensitivity to the combined effects of displacement and collision is **medium** and the magnitude of impact is **low**. The effect is therefore of **minor adverse** significance, which is **not significant** in EIA terms.

10.9.5 Potential Cumulative Effects During Decommissioning

10.9.5.1 Impact D1: Temporary Disturbance and Displacement

350. There is uncertainty about the detail and timing of decommissioning activities. However, in general it would be expected that the type of activity and magnitude of any impact would be broadly similar to that during the construction phase. As with the construction phase (**Section 10.9.3.1**), it is considered that the potential for cumulative effects would be limited to the Bellrock WFDA and OfTDA, with other plans or projects unlikely to contribute to the cumulative effect. Therefore, while it is considered likely that the cumulative effects during the decommissioning phase would be of lower magnitude and significance than during construction, the assessment has assumed, on a precautionary basis, that the effect would be the same for both phases.

351. Overall, it is predicted that sensitivity/value for **guillemot, razorbill, puffin** and **gannet** is **medium**, and the magnitude of impact is **negligible**. The cumulative effect is therefore of **negligible** significance, which is **not significant** in EIA terms. Refer to the construction phase cumulative assessment (**Section 10.9.3.1**) for further information.

10.9.5.2 Impact D2: Temporary Disturbance and Displacement

352. There is uncertainty about the detail and timing of decommissioning activities. However, in general it would be expected that the type of activity and magnitude of any impact would be broadly similar, or less than, that during the construction phase. As with the construction phase

(**Section 10.9.3.2**), it is considered that the potential for cumulative effects would be limited to the Bellrock WFDA and OfTDA, with other plans or projects unlikely to contribute to the cumulative effect. Therefore, while it is considered likely that the cumulative effects during the decommissioning phase would be of lower magnitude and significance than during construction, the assessment has assumed, on a precautionary basis, that the effect would be the same for both phases.

353. Overall, it is predicted that sensitivity/value for all seabird receptors considered in the assessment (kittiwake, great black-backed gull, Arctic tern, Arctic skua, gannet, guillemot, razorbill and puffin) is **medium**, and the magnitude of impact is **low**. The cumulative effect is therefore of **minor adverse** significance, which is **not significant** in EIA terms. Refer to the construction phase cumulative assessment (**Section 10.9.3.2**) for further information.

10.9.6 Summary of Cumulative Effects

354. No significant cumulative effects are predicted during the construction or decommissioning phases of the Bellrock Wind Farm Infrastructure. During the O&M phases, a potential **significant cumulative effect (moderate adverse)** has been identified for the regional **razorbill** population, as a result of disturbance and displacement impacts. However, as noted in the assessment for this species, the contribution of the Bellrock WFDA to the cumulative total is very small, representing less than 1% of predicted mortality across all projects.

355. For all other receptors, it has been concluded that cumulative effects would **not be significant (minor adverse)**. This applies to **guillemot** and **puffin** in respect of disturbance and displacement impacts, and **kittiwake** and **gannet** in respect of disturbance and displacement and collision, both alone and combined.

10.10 Transboundary Effects

356. The transboundary assessment has considered the potential effects of the Bellrock Wind Farm Infrastructure on seabird populations that breed outside of the UK, in respect of the following impact pathways during the O&M phase:

- Disturbance and displacement from the physical presence of WTGs;
- Collision with WTGs; and
- Combined effects of displacement and collision.

357. For other impact pathways, the low or negligible magnitude of impact and limited spatial and/or temporal extent means that transboundary effects can be ruled out.

358. For collision and displacement (alone and combined) within the Bellrock WFDA, these impact pathways have been assessed as having negligible or minor adverse effects on ornithology receptors (refer to **Section 10.8.2**). Any transboundary impacts would affect wider populations that are more distant from the Bellrock WFDA, and would, therefore, be of lesser magnitude. This is because fewer birds from these wider populations would be expected to occur at the

Bellrock WFDA, if at all. Transboundary effects are therefore considered to be, as a worst- case, of **negligible** significance, which is **not significant**. Further consideration of the effects on specific SPA colonies outside of the UK is presented in the **Bellrock WFDA RIAA: Part 3 (Volume VI)**.

10.11 Inter-related and Interacting Impacts

359. Inter-related effects are the potential effects of multiple impacts, effecting one receptor or a group of receptors. Inter-related effects include interactions between the impacts of the different phases of the Bellrock Wind Farm Infrastructure (i.e. interaction of impacts across construction, O&M, and decommissioning), as well as the interaction between impacts on a receptor within a phase. The potential inter-related effects for ornithology receptors are described below.

10.11.1 Inter-relationships

360. **Table 10.69** below provides a summary of the key inter-relationships between offshore ornithology and other technical chapters and indicates the relevant chapters where those issues have been addressed.

Table 10.69: Offshore Ornithology Inter-relationships

Topic and Description	Related Chapter(s)	Where Addressed in this Chapter	Rationale
Construction Phase			
Temporary habitat loss and disturbance	**Chapter 7: Benthic Ecology (Volume II)** **Chapter 8: Fish and Shellfish Ecology (Volume II)**	**Section 10.8.1.1**	Potential impacts on benthic ecology and fish and shellfish ecology during construction could affect the prey resource for birds.
Indirect impacts through effects on habitats and prey during construction	**Chapter 7: Benthic Ecology (Volume II)** **Chapter 8: Fish and Shellfish Ecology (Volume II)**	**Section 10.8.1.2**	Potential impacts on benthic ecology and fish and shellfish ecology during construction could affect the prey resource for birds.
Artificial lighting	**Chapter 12: Shipping and Navigation (Volume II)**	**Section 10.8.1.3**	The effects of artificial lighting during construction could affect seabirds or migratory birds, e.g. as a result of phototaxis.
Indirect impacts from UXO clearance	**Chapter 7: Benthic Ecology (Volume II)** **Chapter 8: Fish and Shellfish Ecology (Volume II)**	**Section 10.8.1.4**	Potential impacts on benthic ecology and fish and shellfish ecology during construction could affect the prey resource for birds.
Operation and Maintenance Phase			
Indirect Effects through impacts to habitat and prey species	**Chapter 7: Benthic Ecology (Volume II)** **Chapter 8: Fish and Shellfish Ecology (Volume II)**	**Section 10.8.2.2**	Potential impacts on benthic ecology and fish and shellfish ecology during O&M could affect the prey resource for birds.
Artificial lighting	**Chapter 12: Shipping and Navigation (Volume II)** **Chapter 13: Aviation and Radar (Volume II)**	**Section 10.8.2.8**	The effects of artificial lighting during O&M could affect seabirds or migratory birds, e.g. as a result of phototaxis.

Topic and Description	Related Chapter(s)	Where Addressed in this Chapter	Rationale
Decommissioning Phase			
Temporary habitat loss and disturbance	**Chapter 7: Benthic Ecology (Volume II)** **Chapter 8: Fish and Shellfish Ecology (Volume II)**	**Section 10.8.3.1**	Potential impacts on benthic ecology and fish and shellfish ecology during decommissioning could affect the prey resource for birds.
Indirect impacts through effects on habitats and prey during construction	**Chapter 7: Benthic Ecology (Volume II)** **Chapter 8: Fish and Shellfish Ecology (Volume II)**	**Section 10.8.3.2**	
Artificial lighting	**Chapter 12: Shipping and Navigation (Volume II)**	**Section 10.8.3.3**	The effects of artificial lighting during decommissioning could affect seabirds or migratory birds, e.g. as a result of phototaxis.

10.11.2 Interactions

361. The impacts identified and assessed in this Chapter have the potential to interact with each other. Areas of potential interaction between impacts are presented in **Table 10.70**, **Table 10.71**, and **Table 10.72** below. The impacts are assessed relative to each development phase (i.e. construction, O&M, or decommissioning) to see if (for example) multiple construction impacts affecting the same receptor could increase the magnitude of impact upon that receptor.

362. A subsequent lifetime assessment has been undertaken which considers the impact interactions identified and the potential for impacts to effect receptors relevant to this Chapter across all development phases (**Table 10.73**).

363. Although some interactions have been identified, **Table 10.73** confirms that any resulting effects would be no greater than for the individually assessed impact pathways. Accordingly, the assessment conclusions remain unchanged.

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Table 10.70: Potential Interaction Between Impacts - Construction

Potential Interaction Between Construction Impacts				
Impact	**C1: Temporary habitat loss and disturbance**	**C2: Indirect impacts from construction noise**	**C3: Artificial lighting**	**C4: Indirect impacts from UXO clearance**
C1: Temporary habitat loss and disturbance		Yes, possible short-medium term effects on birds, but spatial magnitude very limited.	Unlikely interaction or short term and rather sporadic (only at night hours), spatially limited.	Yes, possible short-term effects on birds, but spatial magnitude highly localised.
C2: Indirect impacts from construction noise	Yes, possible short-medium term effects on birds, but spatial magnitude very limited.		Unlikely interaction or short term and rather sporadic (only at night hours), spatially limited.	Yes, possible sporadic, short-term effects on birds, but spatial magnitude highly localised.
C3: Artificial lighting	Unlikely interaction or short term and rather sporadic (only at night hours), spatially limited.	Unlikely interaction or short term and rather sporadic (only at night hours), spatially limited.		Unlikely interaction or short term and rather sporadic (only at night hours), spatially limited.
C4: Indirect impacts from UXO clearance	Yes, possible short-term effects on birds, but spatial magnitude highly localised.	Yes, possible sporadic, short-term effects on birds, but spatial magnitude highly localised.	Unlikely interaction or short term and rather sporadic (only at night hours), spatially limited.	

Table 10.71: Potential Interaction Between Impacts - Operation and Maintenance

Potential Interaction Between O&M Impacts								
Impact	**O1: Disturbance and displacement from the physical WTGs and maintenance activities**	**O2: Temporary disturbance and displacement**	**O3: Indirect effects through impacts to habitat and prey species**	**O4: Barrier to movement**	**O5: Collision with WTGs**	**O6: Combined collision and displacement**	**O7: Secondary entanglement with subsea infrastructure**	**O8: Artificial lighting**
O1: Disturbance and displacement from the physical presence of WTGs and maintenance activities		Possible medium-long term effects on birds, within the Bellrock WFDA.	No interaction.	Possible medium-long term increase of effects.	Unlikely. Displaced birds less not prone to collisions.	Possible increased effects on displaced birds.	No interaction.	Unlikely interaction.
O2: Temporary disturbance and displacement	Possible medium-long term effects on birds, within the Bellrock WFDA.		Possible medium-long term effects on birds, within the Bellrock WFDA.	Possible medium-long term effects on birds, within the Bellrock WFDA.	Unlikely. Displaced birds are less prone to collisions.	Possible increased effects on displaced birds.	No interaction.	Unlikely interaction.
O3: Indirect effects through impacts to habitat and prey species	No interaction.	Possible medium-long term effects on birds, within the Bellrock WFDA.		No interaction.	No interaction.	No interaction.	Very unlikely. In case the Bellrock Wind Farm Infrastructure creates suitable habitats for prey, birds might be attracted and exposed to higher entanglement risk.	No interaction.

Potential Interaction Between O&M Impacts								
Impact	**O1: Disturbance and displacement from the physical WTGs and maintenance activities**	**O2: Temporary disturbance and displacement**	**O3: Indirect effects through impacts to habitat and prey species**	**O4: Barrier to movement**	**O5: Collision with WTGs**	**O6: Combined collision and displacement**	**O7: Secondary entanglement with subsea infrastructure**	**O8: Artificial lighting**
O4: Barrier to movement	Possible medium-long term increase of effects.	Possible medium-long term effects on birds, within the Bellrock WFDA.	No interaction.		Unlikely. Displaced birds less not prone to collisions.	Possible increased effects on displaced birds.	No interaction.	Unlikely interaction.
O5: Collision with wind turbines	Unlikely. Displaced birds less not prone to collisions.	Unlikely. Displaced birds are less prone to collisions.	No interaction.	Unlikely. Displaced birds less not prone to collisions.		Possible increased effects on displaced birds.	No interaction.	Unlikely interaction.
O6: Combined collision and displacement	Possible increased effects on displaced birds.	Possible increased effects on displaced birds.	No interaction.	Possible increased effects on displaced birds.	Possible increased effects on displaced birds.		No interaction.	Unlikely interaction.
O7: Secondary entanglement with subsea infrastructure	No interaction.	No interaction.	Very unlikely. In case the Bellrock Wind Farm Infrastructure creates suitable habitats for prey, birds might be attracted and exposed to higher entanglement risk.	No interaction.	No interaction.	No interaction.		No interaction.
O8: Artificial lighting	Unlikely interaction.	Unlikely interaction.	No interaction.	Unlikely interaction.	Unlikely interaction.	Unlikely interaction.	No interaction.	

Table 10.72: Potential Interaction Between Impacts - Decommissioning

Potential Interaction Between Decommissioning Impacts			
Impact	**D1: Temporary habitat loss and disturbance**	**D2: Indirect impacts from decommissioning noise**	**D3: Artificial lighting**
D1: Temporary habitat loss and disturbance		Yes, possible short-medium term effects on birds, but spatial magnitude very limited.	Unlikely interaction or short term and rather sporadic (only at night hours), spatially limited.
D2: Indirect impacts from decommissioning noise	Yes, possible short-medium term effects on birds, but spatial magnitude very limited.		Unlikely interaction or short term and rather sporadic (only at night hours), spatially limited.
D3: Artificial lighting	Unlikely interaction or short term and rather sporadic (only at night hours), spatially limited.	Unlikely interaction or short term and rather sporadic (only at night hours), spatially limited.	

Table 10.73: Potential Interactions Between Impacts - Phase and Lifetime Assessment

Highest Significance of Effect Level					
Impact/Receptor	**Construction**	**O&M**	**Decommissioning**	**Phase Assessment (Construction or Operation and Maintenance or Decommissioning – see Chapter 5: EIA Methodology (Volume II))**	**Lifetime Assessment**
Disturbance and Displacement Guillemot, razorbill, puffin, gannet	Negligible adverse	Negligible adverse	Negligible adverse	No greater than individually assessed impact for each phase. The impacts are considered to have a negligible adverse effect on the receptor at most. Given that each impact is localised, it is considered that effects would not, when considered together, result in appreciably greater impact than assessed individually.	No greater than individually assessed impact. As with the phase assessment, all potential impacts are non-significant, separated temporally, localised in nature, limiting the potential for different impacts to interact across the different phases.
Impacts to Habitats and Prey Species Kittiwake, great black-backed gull, Arctic tern, Arctic skua, gannet, guillemot, razorbill and puffin	Minor adverse	Negligible adverse	Minor adverse	No greater than individually assessed impact for each phase. The impacts are considered to have a minor adverse effect on the receptor at most. Given that each impact is localised, it is considered that effects would not, when considered together, result in appreciably greater impact than assessed individually.	No greater than individually assessed impact. As with the phase assessment, all potential impacts are non-significant, separated temporally, localised in nature, limiting the potential for different impacts to interact across the different phases.
Artificial Light Kittiwake, great black-backed gull, Arctic tern, Arctic skua, gannet, guillemot, razorbill and puffin	Negligible adverse	Negligible adverse	Negligible adverse	No greater than individually assessed impact for each phase. The impacts are considered to have a negligible adverse effect on the receptor. Given that each impact is localised, it is considered that effects would not, when considered together, result in appreciably	No greater than individually assessed impact. As with the phase assessment, all potential impacts are non-significant, separated temporally, localised in nature, limiting the potential for different impacts to interact across the different phases.

Highest Significance of Effect Level					
				greater impact than assessed individually.	
Indirect Impacts from UXO Clearance Kittiwake, great black-backed gull, Arctic tern, Arctic skua, gannet, guillemot, razorbill and puffin	Negligible adverse	NA	NA	No greater than individually assessed impact for each phase. The impacts are considered to have a negligible adverse effect on the receptor. Given that each impact is localised, it is considered that effects would not, when considered together, result in appreciably greater impact than assessed individually.	No greater than individually assessed impact. As with the phase assessment, all potential impacts are non-significant, separated temporally, localised in nature, limiting the potential for different impacts to interact across the different phases.
Barrier To Movement Migratory non-seabirds (Marine SPAs, Migratory Non-Seabird Sites)	NA	Negligible adverse	NA	No greater than individually assessed impact for each phase. The impacts are considered to have a negligible adverse effect on the receptor at most. Given that each impact is localised, it is considered that effects would not, when considered together, result in appreciably greater impact than assessed individually.	No greater than individually assessed impact. As with the phase assessment, all potential impacts are non-significant, separated temporally, localised in nature, limiting the potential for different impacts to interact across the different phases.
Collision Risk Kittiwake, great black-backed gull, Arctic tern, Arctic skua, gannet, guillemot, razorbill, puffin. Migratory non-seabirds Barrier Effect (Marine SPAs, Migratory Non-Seabird Sites)	NA	Minor adverse	NA	No greater than individually assessed impact for each phase. The impacts are considered to have a minor adverse effect on the receptor at most. Given that each impact is localised, it is considered that effects would not, when considered together, result in appreciably greater impact than assessed dually.	No greater than individually assessed impact. As with the phase assessment, all potential impacts are non-significant, separated temporally, localised in nature, limiting the potential for different impacts to interact across the different phases.

10.12 Summary

364. **Table 10.74** presents a summary of the assessment of potential effects on offshore ornithology during the construction, O&M and decommissioning phases of the Bellrock Wind Farm Infrastructure.

365. The assessment has established that for the Bellrock WFDA alone, during the construction, O&M and decommissioning phases, all effects on offshore ornithology receptors would be **negligible** or **minor adverse**, and would **not be significant** in EIA terms.

366. During the operational phase of the Bellrock Wind Farm Infrastructure, the assessment has identified a potential **moderate adverse** effect on the regional razorbill population, when considered in-combination with other plans and projects, as a result of disturbance and displacement impacts. This effect is considered **significant** at the EIA scale. However, as set out in **Section 10.9.4.1.2.3.1**, the conclusion is considered to exaggerate actual effects on this feature, due to imbalance in the derivation of population size and cumulative mortality when using the approach advised by NatureScot. When the applied foraging range is increased to reduce this bias, this results in a marked reduction (c. 50%) in the scale of the increase in mortality. For all other features, the cumulative assessment concludes a **minor adverse** effect, which is **not significant**.

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Table 10.74: Summary of Potential Effects for Offshore Ornithology

Potential Impact	Receptor(s)	Sensitivity	Magnitude of Impact	Significance of Effect	Secondary Mitigation	Residual Significance of Effect	Cumulative Residual Significance of Effect
Construction							
C1: Temporary Disturbance and Displacement	Guillemot, razorbill, puffin and gannet	Medium	Negligible	Negligible adverse	Best practice measures to minimise disturbance risk included in VMNSP	Negligible adverse (not significant)	Negligible adverse (not significant)
C2: Indirect Effects through Impacts to Habitats and Prey Species	Kittiwake, great black-backed gull, Arctic tern, Arctic skua, gannet, guillemot, razorbill and puffin	Medium	Low	Minor adverse	None	Minor adverse (not significant)	Minor adverse (not significant)
C3: Artificial Lighting	N/A (no sensitive seabird species present at the Bellrock WFDA)	Negligible	Negligible	Negligible adverse	None	Negligible adverse (not significant)	N/A
C4: Indirect Impacts from UXO Clearance	Kittiwake, great black-backed gull, Arctic tern, Arctic skua, gannet, guillemot, razorbill and puffin	Medium	Negligible	Negligible adverse	None	Negligible adverse (not significant)	N/A
Operation and Maintenance							
O1: Temporary Disturbance and Displacement	Guillemot, puffin gannet and razorbill	Medium	Negligible	Negligible adverse	None	Negligible adverse (not significant)	N/A

Potential Impact	Receptor(s)	Sensitivity	Magnitude of Impact	Significance of Effect	Secondary Mitigation	Residual Significance of Effect	Cumulative Residual Significance of Effect
O2: Indirect Effects through Impacts to Habitats and Prey Species	Kittiwake, great black-backed gull, Arctic tern, Arctic skua, gannet, guillemot, razorbill and puffin	Medium	Negligible	Negligible adverse	None	Negligible adverse (not significant)	N/A
O3: Disturbance and Displacement from the Physical Presence of WTGs	Kittiwake, guillemot, puffin and gannet	Medium	Negligible	Negligible adverse	None	Negligible adverse (not significant)	Minor adverse (not significant)
	Razorbill	Medium	Negligible	Negligible adverse	None	Negligible adverse (not significant)	Moderate adverse (significant)[1]
O4: Barrier to Movement	Migratory Non-seabirds	Low	Negligible	Negligible adverse	None	Negligible adverse (not significant)	N/A
O5: Collision with WTGs	Kittiwake and gannet	Medium	Negligible	Negligible adverse	None	Negligible adverse (not significant)	Minor adverse (not significant)
	Arctic tern and Arctic skua	Medium	Negligible	Negligible adverse	None	Negligible adverse (not significant)	N/A
	Great black-backed gull	High	Negligible	Minor adverse	None	Minor adverse (not significant)	N/A
	Migratory non-seabird species	Medium	No effect to Low	No effect, negligible or minor adverse	None	Negligible adverse (not significant)	N/A

Potential Impact	Receptor(s)	Sensitivity	Magnitude of Impact	Significance of Effect	Secondary Mitigation	Residual Significance of Effect	Cumulative Residual Significance of Effect
O6: Combined Collision and Displacement	Kittiwake and gannet	Medium	Negligible	Negligible adverse	None	Minor adverse (not significant)	Minor adverse (not significant)
O7: Secondary Entanglement with Subsea Infrastructure	Guillemot, razorbill and puffin	High	Negligible	Minor adverse	None	Minor adverse (not significant)	N/A
O8: Artificial Lighting	N/A (no sensitive seabird species present at Bellrock WFDA)	Negligible	Negligible	Negligible adverse	None	Negligible adverse (not significant)	N/A
Decommissioning							
D1: Temporary Disturbance and Displacement	Guillemot, razorbill, puffin and gannet	Medium	Negligible	Negligible adverse	None	Negligible adverse (not significant)	Negligible adverse (not significant)
D2: Indirect Impacts	Kittiwake, great black-backed gull, Arctic tern, Arctic skua, gannet, guillemot, razorbill and puffin	Medium	Low	Minor adverse	None	Minor adverse (not significant)	Minor adverse (not significant)
D3: Artificial Lighting	N/A (no sensitive seabird species present at Bellrock WFDA)	Negligible	Negligible	Negligible adverse	None	Negligible adverse (not significant)	N/A

Notes:

[1] As set out in **Section 10.9.4.1.2.3.1**, the conclusion may exaggerate actual effects on this feature and should be treated with caution.

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10.13 References

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