Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Appendix 4 - Gannet, Guillemot and Razorbill Compensation Document (Revision B) (Clean)

Revision B
Deadline 3
May 2023
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Title**:** **Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects DCO Application** **Appendix 4: Gannet, Guillemot and Razorbill Compensation Document (Revision B) (Clean)**		
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Glossary of Acronyms

AEoI	Adverse Effect on Integrity
AWD	Above Water Deterrent
BDMPS	Biologically Defined Minimum Population Scales
BEIS	Business Energy and Industrial Strategy
CCTV	Closed Circuit Television
CGR	Counterfactual of Growth Rate
CIMP	Compensation Implementation and Monitoring Plan
CPS	Counterfactual of Population Size
CRM	Collision Risk Model
DCO	Development Consent Order
DECC	Department for Energy and Climate Change
Defra	Department for the Environment and Rural Affairs
DEL	Dudgeon Extension Limited
DEP	Dudgeon Offshore Wind Farm Extension Project
DIN	Dissolved Inorganic Nitrogen
DML	Deemed Marine Licence
DO	Dissolved Oxygen
DOW	Dudgeon Offshore Wind Farm
EC	European Commission
EEZ	European Economic Zone
EIA	Environmental Impact Assessment
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Topic Group
EU	European Union
FFC	Flamborough and Filey Coast
FID	Final Investment Decision
GGRCSG	Gannet, Guillemot and Razorbill Compensation Steering Group
HRA	Habitats Regulations Assessment
IFCA	Inshore Fisheries and Conservation Authority
IROPI	Imperative Reasons of Overriding Public Interest

JNCC	Joint Nature and Conservation Committee
km	Kilometre
LEB	Looming Eyes Buoy
LSE	Likely Significant Effect
MMO	Marine Management Organisation
MPA	Marine Protected Area
NE	Natural England
OWF	Offshore Wind Farm
OWIC	Offshore Wind Industry Council
PINS	The Planning Inspectorate
PVA	Population Viability Analysis
REM	Remote Electronic Monitoring
RIAA	Report to Inform Appropriate Assessment
RSPB	Royal Society for the Protection of Birds
SEL	Scira Extension Limited
SEP	Sheringham Shoal Offshore Wind Farm Extension Project
SMP	Seabird Monitoring Programme
SNCB	Statutory Nature Conservation Body
SoS	Secretary of State
SOW	Sheringham Shoal Offshore Wind Farm
SOWEC	Scottish Offshore Wind Energy Council
SPA	Special Protected Area
SPEA	Portuguese Society for the Study of Birds
STCSG	Sandwich Tern Compensation Steering Group
TDR	Transfer Digital Records
UK	United Kingdom

Glossary of Terms

Blim	A deterministic biomass limit below which a fish stock is considered to have reduced reproductive capacity.
Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
DEP offshore site	The Dudgeon Offshore Wind Farm Extension consisting of the DEP wind farm site, interlink cable corridors and offshore export cable corridor (up to mean high water springs).
European site	Sites designated for nature conservation under the Habitats Directive and Birds Directive. This includes candidate Special Areas of Conservation, Sites of Community Importance, Special Areas of Conservation, potential Special Protection Areas, Special Protection Areas, Ramsar sites, proposed Ramsar sites and sites compensating for damage to a European site and is defined in regulation 8 of the Conservation of Habitats and Species Regulations 2017, although some of the sites listed here are afforded equivalent policy protection under the National Planning Policy Framework (2021) (paragraph 176) and joint Defra/Welsh Government/Natural England/NRW Guidance (February 2021).
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach, and information to support, the EIA and HRA for certain topics.
Expert Topic Group (ETG)	A forum for targeted engagement with regulators and interested stakeholders through the EPP.
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
SEP offshore site	Sheringham Shoal Offshore Wind Farm Extension consisting of the SEP wind farm site and offshore export cable corridor (up to mean high water springs).
The Applicant	Equinor New Energy Limited. As the owners of SEP and DEP, Scira Extension Limited (SEL) and Dudgeon Extension Limited (DEL) are the named undertakers that have the benefit of the Development Consent Order. References in this document to obligations on, or commitments by, 'the Applicant' are given on behalf of SEL and DEL as the undertakers of SEP and DEP.

1 Revision B Updates at Deadline 3

1. This document has been updated at Deadline 3 to include additional information on the Applicant's without prejudice bycatch reduction compensatory measure proposal (**Section 9.2**) for guillemot and razorbill. In addition, the Applicant has submitted **Annex 4B Auk Bycatch Reduction Feasibility Statement** [document reference 5.5.4.3] which provides further evidence to support the Applicant's without prejudice compensation proposal.
2. Regarding the inclusion of gannet within this compensation document, whilst Natural England has indicated [RR-063] that *"on the basis of the information so far provided, we believe there will be no requirement for provision of gannet compensation"*, they have not been able to formalise this position ahead of Deadline 3. The Applicant notes that the updated gannet assessment provided within the Deadline 1 version of the **Apportioning and Habitats Regulations Assessment Updates Technical Note** [REP-057] is considered to provide all the required information to allow Natural England to reach a conclusion that an adverse effect on integrity can be ruled out. However, the Applicant notes that Natural England is intending to provide comments on this document at Deadline 3 so there may be some matters that remain unresolved although the Applicant has not been made aware that there are any which may necessitate an update to the gannet assessment. Therefore, the Applicant has retained gannet within this document with the intention to resubmit a future iteration with gannet removed once formal advice confirming this approach has been provided by Natural England.

2 Introduction

2.1 Background

3. The Sheringham Shoal Offshore Wind Farm Extension Project (SEP) and Dudgeon Offshore Wind Farm Extension Project (DEP) are proposed extensions to the existing Sheringham Shoal and Dudgeon Offshore Wind Farms (SOW and DOW). When operational, SEP and DEP would have the potential to generate renewable power for around 785,000 United Kingdom (UK) homes from up to 23 wind turbines at SEP and up to 30 wind turbines at DEP.
4. Equinor New Energy Limited (The Applicant) submitted an application for a Development Consent Order (DCO) including a **Report to Inform Appropriate Assessment (RIAA)** [APP-059], which provides the information necessary for the competent authority to undertake an appropriate assessment to determine if there is any adverse effect on integrity (AEoI) on the national site network. The **Apportioning and Habitats Regulations Assessment Update Technical Note (Revision B)** [REP2-037] provides an updated assessment for the guillemot (in-combination) and razorbill (project-alone and in-combination) features of the Flamborough and Filey Coast (FFC) Special Protection Area (SPA).
5. The Applicant has reached a conclusion of no AEoI for the gannet, guillemot and razorbill features of the FFC SPA, as evidenced in the **RIAA** [APP-059] and the

Apportioning and Habitats Regulations Assessment Update Technical Note (Revision B) [REP2-037] . In the event that the Secretary of State (SoS) is unable to reach the same conclusion, the Applicant has developed compensatory measures that could be applied to provide compensation for the predicted impacts, which are set out in this Gannet, Guillemot and Razorbill Compensation Document. The compensatory measures are therefore being proposed without prejudice to the Applicant's position that there is no AEoI. This forms part of the Applicant's overarching **Habitats Regulations Derogation Provision of Evidence** [APP-063] submission.

2.2 Purpose of Document

6. This document sets out the detail of the proposed without prejudice compensatory measures for gannet, guillemot and razorbill from the FFC SPA. It demonstrates how the proposed compensatory measures can be secured and that the mechanism for delivery can be implemented. Should compensation be required, the Gannet, Guillemot and Razorbill Compensation Implementation and Monitoring Plan (CIMP) will be produced by the Applicant and approved by the SoS prior to the start of construction, based on the outline version provided with the DCO application (**Annex 4A Gannet, Guillemot and Razorbill Outline Compensation Implementation and Monitoring Plan** [APP-075]). The Gannet, Guillemot and Razorbill CIMP will set out the detailed delivery proposals for the agreed compensatory measures based on those set out in this Gannet, Guillemot and Razorbill Compensation Document.

7. As such this document provides the following details (where relevant) of each of the proposed compensatory measures for gannet, guillemot and razorbill:

- Overview;
- Delivery Mechanism i.e. how the proposed measures will be delivered;
- Scale;
- Location;
- Outline Design Details;
- Timescales;
- Monitoring, Maintenance and Adaptive Management;
- Outline Implementation and Delivery Roadmap; and
- Potential Impacts from Implementation of the Compensation.

2.3 Implications of the Project Development Scenarios

8. SEP and DEP may be delivered under a range of project development scenarios. Details of the scenarios and how these are reflected in the DCO application is set out in the **Scenarios Statement** [APP-314]. The pre-application engagement relating to the proposed compensatory measures has assumed that both projects are developed, and the package of measures proposed for FFC SPA gannet,

guillemot and razorbill is considered by the Applicant to deliver the level of compensation required in comparable proportion (factoring in the risks and uncertainties associated with delivering successful compensation) to address the worst-case impacts of both SEP and DEP, as required by draft Defra guidance (Defra, 2021).

9. The scenario under which SEP and/or DEP will be delivered will be confirmed prior to the commencement of the authorised development, and the **Draft DCO (Revision F)** [document reference 3.1] secures the requirement to notify the relevant planning authority and the MMO as appropriate of which scenario is being undertaken. This will need to be confirmed before further requirements of the DCO and conditions of the Deemed Marine Licences (DMLs) can be discharged.

10. The Applicant has considered the requirements for compensation under each project development scenario and has determined that the delivery of the proposed measures under each scenario is dependent on how scalable the given measure is.

11. The project development scenarios for SEP and DEP can be broadly categorised as:

- In isolation – where only SEP or DEP is constructed;
- Sequential – where SEP and DEP are both constructed in a phased approach with either SEP or DEP being constructed first; or
- Concurrent – where SEP and DEP are both constructed at the same time.

12. The **Scenarios Statement** [APP-314] describes the ambition to deliver SEP and DEP with an integrated transmission system, however the predicted impacts on gannet, guillemot and razorbill are no different if the transmission system for the two projects are delivered integrated or separately.

13. Where both projects are delivered in the sequential scenario, the overall final package of compensation to be delivered will be the same as in the concurrent scenario. The Applicant therefore considers it practical to deliver all of the compensation at the same time under either the sequential or concurrent scenario. In the sequential scenario this may mean that one project delivers compensation earlier than may have otherwise been required if it were a standalone project, which could be at risk e.g. prior to Final Investment Decision (FID). The Applicant considers however that the second project would have the benefit of the compensation being in place slightly longer than the first project thereby reducing pressure on the onward project programme.

14. Should SEP or DEP be delivered in isolation then it would be necessary to deliver only the scale of measures required to achieve adequate compensation in proportion to the impacts predicted from the given project (SEP or DEP). Where this is not practical because the measure is not ecologically scalable, the Applicant is proposing to deliver the compensation measure to its full extent. Where compensation is scalable, or partially scalable, compensation would be delivered on a scale appropriate to the nature and extent of the predicted impact from SEP, or from DEP.

15. It should be noted that, as owners of SEP and DEP, Scira Extension Limited (SEL) and Dudgeon Extension Limited (DEL) are the named undertakers that have the benefit of the DCO. References throughout this document and any supporting annexes to obligations on, or commitments by, 'the Applicant' are given on behalf of SEL and DEL as the undertakers of SEP and DEP.

3 Legislation and Guidance

16. The Habitats Regulations Assessment (HRA) process covers those features designated under the European Council Directive 2009/147/EC on the conservation of wild birds (the 'Birds Directive') and Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive'). These are implemented into UK legislation by the Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017. The UK also has to meet its obligations under relevant international agreements such as the Ramsar Convention.

17. The UK exited the European Union (EU) on 31st January 2020. The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 provide amendments to the Habitats Regulations to enable their continued operation following the UK's exit from the EU (see **Section 3.1**).

18. The Birds Directive provides a framework for the conservation and management of wild birds in Europe. The relevant provisions of the Directive are the identification and classification of SPAs for rare or vulnerable species listed in Annex I of the Directive and for all regularly occurring migratory species (required by Article 4). The Directive requires national Governments to establish SPAs and to have in place mechanisms to protect and manage them. The SPA protection procedures originally set out in Article 4 of the Birds Directive have been replaced by the Article 6 provisions of the Habitats Directive.

19. Full details of the relevant legislative and policy context are provided in **Habitats Regulations Derogation Provision of Evidence** [APP-063].

3.1 UK National Legislation

20. The Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017 (hereafter the 'Habitats Regulations') together with the Wildlife and Countryside Act 1981 transpose the Habitats and Birds Directives into UK legislation covering terrestrial areas out to and including the UK Offshore Marine Area with the exception of within Scottish territorial waters, where The Conservation (Natural Habitats, &c.) Regulations 1994 continue to apply.

21. The Conservation of Habitats and Species Amendment (EU Exit) Regulations 2019 (the EU Exit Regulations) make changes to the Habitats Regulations so that they continue to work (are operable) following the UK's exit from the EU on 31st January 2020. While the basic legal framework for HRA is maintained, the EU Exit Regulations transfer functions previously undertaken by the European Commission

(EC) to UK Ministers. Furthermore, where the Habitats Regulations continue to use the term 'European sites', those sites now form part of a 'National Site Network' rather than the European 'Natura 2000' site network.

22. The Habitats Regulations place an obligation on 'competent authorities' to carry out an appropriate assessment of any proposal likely to significantly affect a designated site, to seek advice from Natural England and not to approve an application that would have an adverse effect on a designated site unless certain conditions are met (where there are no alternative solutions, the plan or project can only proceed if there are imperative reasons of over-riding public interest and if the necessary compensatory measures can be secured). The competent authority in the case of SEP and DEP is the SoS for Business Energy and Industrial Strategy (BEIS).

3.2 Guidance on Compensatory Measures

23. Should the Competent Authority conclude that, following Appropriate Assessment, an AEoI on a European site cannot be ruled out, that there are no alternative solutions and that there are Imperative Reasons of Over-riding Public Interest (IROPI), Article 6(4) of the Habitats and Birds Directives *"requires that all necessary compensatory measures are taken to ensure the overall coherence of the network of European sites as a whole is protected*."

24. Department for the Environment and Rural Affairs (Defra) (2021a) and European Commission (EC) (2012 and 2018) explain that for SPAs, the overall coherence of the European site network can be maintained by:

- Compensation that fulfils the same purposes that motivated the site's designation;
- Compensation that fulfils the same function along the same migration path; and
- The compensation site(s) are accessible with certainty by the birds usually occurring on the site affected by the project.

25. The guidance provides an element of flexibility, recognising that compensation of a '*like for like'* habitat and/or in the same designated site may not be practicable.

26. Compensation should not be used to address issues that are causing designated habitats or species to be in an unfavourable condition. This is the responsibility of the UK Government.

27. Ideally, compensation should be functioning before the effect takes place, although it is recognised that this may not always be possible, as stated in the Defra (2021a) and EC (2012) guidance: "*in principle, the result of implementing compensation has normally to be operational at the time when the damage is effective on the site concerned. Under certain circumstances where this cannot be fully fulfilled, overcompensation would be required for the interim losses*."

28. Draft guidance has been published by Defra 'Best practice guidance for developing compensatory measures in relation to Marine Protected Areas' (Defra, 2021b), including a hierarchy within which to consider compensatory measures for the

marine environment. This guidance also recognises the potential issues with the ability to provide 'like-for-like' compensation stating:

> "*As it will not always be possible to deliver compensatory measures in a like-for like capacity as is accepted terrestrially, Defra has created a framework to help advisors, regulators and developers to explore and develop compensatory measures. The underlying principle is that compensatory measures that benefit the same feature which is impacted by the development will be the most preferable as they balance the damage caused by the development.*
>
> *Each step down the hierarchy moves away from like for like measures and therefore may decrease the certainty of success, and therefore increase the extent of compensation required. The key is to ensure the biological structure and function of the network is maintained. The more significant the impact to the protected feature or species, the more important it is that compensatory measures are developed within steps 1 and 2 of the Hierarchy of Compensatory Measures.*"

29. Compensatory measures for the gannet, guillemot and razorbill features of the FFC SPA are presented in the following sections in line with this guidance and the hierarchy presented within it.

30. In addition, Natural England has developed a list of those aspects of compensatory measures that it considers need to be described in detail when developers are submitting or updating applications where impacts on marine protected areas (MPA) are anticipated. Whilst not exhaustive, it lists key areas where Natural England considers sufficient detail is needed to provide the SoS with appropriate confidence that compensatory measures can be secured. The list is summarised below:

1) What, where, when: clear and detailed statements regarding the location and design of the proposal;
2) Why and how: ecological evidence to demonstrate compensation for the impacted site feature is deliverable in the proposed locations;
3) Demonstrate that on ground construction deliverability is secured and not just the requirement to deliver in the DCO i.e. landowner agreement is in place;
4) Policy/legislative mechanism for delivering the compensation (where needed);
5) Agreed DCO / DML conditions;
6) Clear aims and objectives of the compensation;
7) Mechanism for further commitments if the original compensation objectives are not met – i.e. adaptive management;
8) Clear governance proposals for the post-consent phase – we do not consider simply proposing a steering group is sufficient;
9) Ensure development of compensatory measures is open and transparent as a matter of public interest, including how information on the compensation would be publicly available;

10) Timescales for implementation esp. where compensation is part of a strategic project, including how timescales relate to the ecological impacts from the development;

11) Commitments to monitoring specified success criteria;

12) Proposals for ongoing 'sign off' procedure for implementing compensation measures throughout the lifetime of the project. Including implementing feedback loops from monitoring; and

13) Continued annual management of the compensation area and ensure other factors are not hindering the success of the compensation e.g. changes in habitat, increased disturbance as a result of subsequent plans/projects.

31. This list, and an equivalent list provided by Royal Society for the Protection of Birds (RSPB) has been used to help guide the development of the proposed compensatory measures at the pre-application stage.

4 Development of Compensatory Measures – Methodology

4.1 General Approach

32. The approach taken by the Applicant to identify potential compensatory measures and for considering their suitability is as follows (also see **Appendix 1 Compensatory Measures Overview** [APP-064]):

- Review of compensatory measures discussed in Furness *et al*. (2013) (see **Section 7.1**);
- Iterative development of the proposals through a detailed process of consultation with relevant stakeholders, implemented in this case through an extension to the ornithology Expert Topic Group (ETG) as part of the Projects' Evidence Plan Process (EPP). This group includes the Marine Management Organisation (MMO), Natural England, RSPB and National Trust. The Planning Inspectorate (PINS) were also invited to attend. Details of the consultation undertaken including minutes of the ETG meetings are provided in the **Consultation Report** [APP-029];
- Engagement with other stakeholders where necessary including with other offshore wind farm (OWF) developers, Natural England and Defra through the Offshore Wind Industry Council (OWIC) Derogation Subgroup;
- Ongoing review of other OWF applications for which compensatory measures have been presented (e.g. Hornsea Project Three, Norfolk Vanguard and Norfolk Boreas, East Anglia One North/Two and Hornsea Project Four), including those accepted as appropriate in the determination (to date all of these projects other than Hornsea Project Four which is yet to be determined);

- Consideration of emerging evidence on wind farm and seabird interactions and influences on seabird ecology more widely to determine whether novel options may be appropriate; and
- Features of the options identified through this process were then considered in relation to various criteria (feasibility, spatial and temporal scale, how it would be monitored, etc.).

33. As described in **Section 7.1**, project-led, collaborative and strategic delivery models have been considered. Those measures that would appear to be more appropriate to be taken forward as part of a collaborative approach with other developers, or a strategic approach by Government and industry, or a combination of the two, are described in detail in the **Strategic and Collaborative Approaches to Compensation and Measures of Equivalent Environmental Benefit** [APP-084]. An update with respect to measures proposed for implementation via a collaborative or strategic delivery model is provided in Section 4.4 of **Habitats Regulations Assessment Derogation and Compensatory Measures Update (Revision B)** [document reference 13.7].

34. The Applicant also notes that it is likely that impacts of OWF will prove to be much less than the precautionary estimates derived following Statutory Nature Conservation Body (SNCB) guidance (e.g. as currently advised by Natural England guidance on collision risk modelling and displacement assessments, apportioning and population modelling), in which case it will be important to avoid over-compensation, since there may be a need to retain potential for future compensation as further projects are developed. Therefore the importance of adaptive management over the timescale of the Projects has been recognised to ensure that compensation is adequate, but does not overcompensate at potential detriment to future projects.

4.2 Summary of Consultation Undertaken

35. The Applicant has given early and detailed consideration to the requirement for compensatory measures and has consulted with a range of stakeholders at regular intervals throughout the pre- and post-application process. Feedback from the consultation has been used to shape the development of the compensatory measures. Consultation has included:

- As described above, an Ornithology Compensation ETG was set up as a part of the Projects' EPP. Of relevance to gannet, guillemot and razorbill, ETG members have included the MMO, NE and RSPB. Three Ornithology Compensation ETG meetings were held between January and June 2022 where potential measures were discussed with regard to gannet, guillemot and razorbill. Compensatory measures were also discussed in more general terms at earlier stages of the pre-application process as part of the Offshore Ornithology ETG meetings in December 2020 and August 2021;

- In November 2021 the Applicant provided ETG members with the document 'Initial Review of Compensatory Measures for Gannet, Guillemot and Razorbill' (included at **Annex 1C Initial Review of Compensatory Measures for Gannet, Guillemot and Razorbill** [APP-067]). That document summarised the alone and in-combination impacts as predicted at the time and the potential compensatory measures for these species with feedback sought on the nature of the measures proposed. Feedback was discussed with the Ornithology Compensation ETG in January 2022;
- In April 2022 the Applicant provided ETG members with an HRA Compensation Briefing Note, which was designed to share the main updates in the development of the proposed compensatory measures since the last round of consultation and to enable more targeted engagement around the key remaining issues and questions. This included information on a proposed non like-for-like compensation option for gannet; and prey enhancement and fishery bycatch reduction for guillemot and razorbill. The briefing note also provided details of three potential delivery models for each of the measures under consideration, including project-led, collaborative and strategic delivery. Feedback was discussed with the Ornithology Compensation ETG in April 2022;
- In follow up to the April 2022 Ornithology Compensation ETG, a meeting was held with the RSPB in May 2022 to discuss potential fishery bycatch reduction measures, covering gannet, guillemot and razorbill;
- The final pre-application Ornithology Compensation ETG meeting was held in June 2022, including an update on the development of the proposed compensatory measures for gannet, guillemot and razorbill since the last meeting;
- Meetings were held with PINS through the pre-application process in order to appraise them of the intended approach to the derogation case for the Projects and the development of the associated compensatory measures (meetings held in November 2020, February 2021, January 2022 and July 2022); and
- Opportunities for the development of strategic approaches to compensation were discussed directly with Defra, including in meetings in June 2021 and December 2021.

36. A full record of the pre-application consultation undertaken, the feedback received and the regard given to this by the Applicant in developing the compensatory measures are provided in **Annex 1D Record of HRA Derogation Consultation** [APP-068]. Minutes of the ETG meetings are appended to the **Consultation Report** [APP-029]. Since submission of the DCO application, the Applicant has continued to consult with the ETG and other stakeholders on its proposals for compensatory measures. Details of this are provided within the **HRA Derogation and Compensatory Measures Update (Revision B)** [document reference 13.7].

5 Flamborough and Filey Coast SPA

5.1 Overview

37. The FFC SPA was designated in 2018. It is a geographical extension to the former Flamborough Head and Bempton Cliffs SPA, which was designated in 1993 (Natural England, 2018).

38. The SPA is located on the Yorkshire coast between Bridlington and Scarborough, and is composed of two sections. The northern section runs from Cunstone Nab to Filey Brigg, and the southern section from Speeton, around Flamborough Head, to South Landing. The seaward boundary extends 2km offshore and applies to both sections of the SPA.

39. The predominantly chalk cliffs of Flamborough Head rise to 135m and have been eroded into a series of bays, arches, pinnacles and gullies. The cliffs from Filey Brigg to Cunstone Nab are formed from various sedimentary rocks including shales and sandstones. The adjacent sea out to 2km off Flamborough Head as well as Filey Brigg to Cunstone Nab is characterised by reefs supporting kelp forest communities in the shallow subtidal, and faunal turf communities in deeper water. The southern side of Filey Brigg shelves off gently from the rocks to the sandy bottom of Filey Bay. This site does not support any priority habitats or species (Natural England, 2018).

40. The coastal areas of the SPA cover cliffs supporting internationally important breeding populations of seabirds[1], the marine extension includes areas close to the colony used by seabirds for maintenance behaviours (loafing, preening etc).

5.2 Conservation Objectives

41. The site's conservation objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- The extent and distribution of the habitats of the qualifying features;
- The structure and function of the habitats of the qualifying features;
- The supporting processes on which the habitats of the qualifying features rely;
- The populations of each of the qualifying features; and
- The distribution of qualifying features within the site.

5.3 Designated Feature – Gannet

42. Within the FFC SPA, gannets nest along a 5km stretch of Bempton Cliffs. Numbers have increased steadily since the colony was established in the 1930's (Cramp *et*

[1] All population estimates discussed in this document are from before impacts of Highly Pathogenic Avian Influenza became evident.

al., 1974). Natural England (2020) gives counts of 3,940 pairs in 2004 and 7,859 in 2009, indicating that colony size more or less doubled over this period. JNCC (2022) indicates that on average, the colony has grown by 700 pairs each year between 2009 and 2017, and that on average, numbers have increased by just over 10% for the last thirty years. The growth rate of the population has increased since 2000, and there is potential for further increase because large numbers of sub-adult birds are associated with the colony (Langston *et al.*, 2013; Natural England, 2020). The colony counts between 1986 and 2017, along with a linear trend line, are presented in **Plate 5-1**. Between these years, the average annual increase in counts of apparently occupied nests was 12%. The average annual increase declined to 4% during the last five years for which counts were available (2012 to 2017). Despite this recent slowing of the growth rate, it seems quite clear that the breeding gannet population at the FFC SPA is of favourable conservation status.

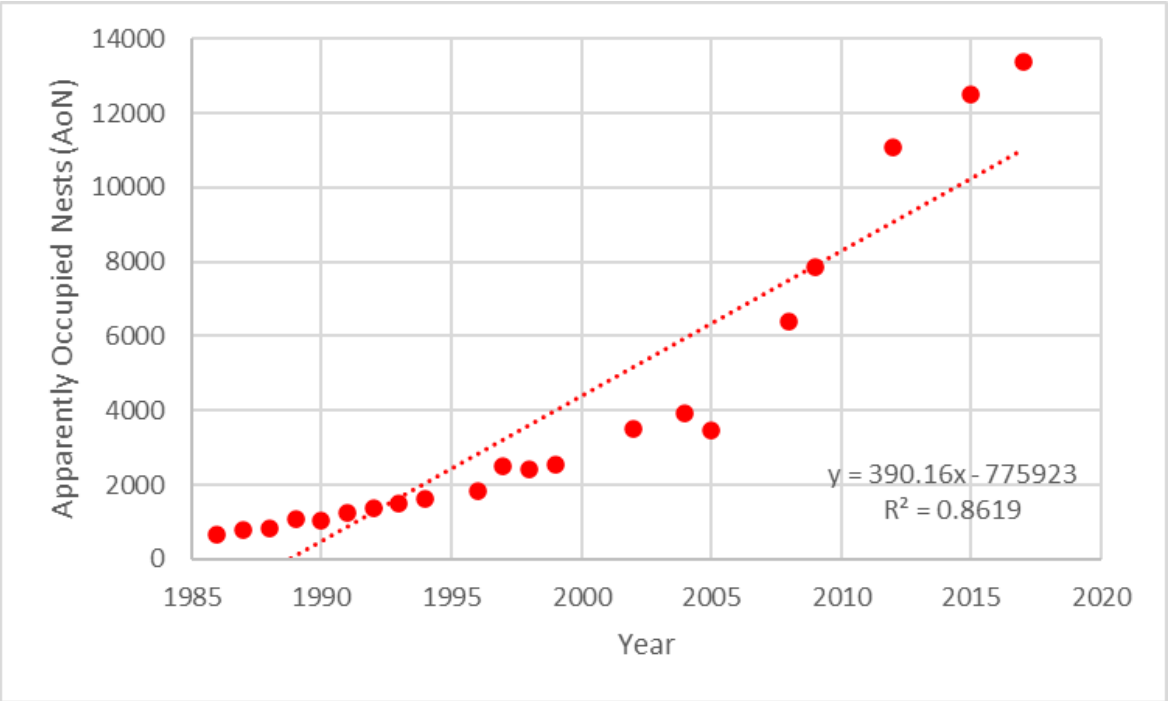


Plate 5-1: Gannet Counts (Apparently Occupied Nests) at the FFC SPA Between 1986 and 2017, with Linear Trendline

43. The SPA breeding population at classification was 8,469 pairs or 16,938 breeding adults, for the period 2008 to 2012 (Natural England, 2018). The most recent whole colony census, carried out in 2017, counted 13,392 pairs or 26,784 breeding adults (Aitken *et al.*, 2017). The latter estimate is considered the best available evidence for the gannet population of this designated site. Using the published adult mortality rate of 0.081 (Horswill and Robinson, 2015), 2,170 birds would be expected to die annually from the breeding adult population of 26,784 individuals.

44. Supplementary advice on the conservation objectives were added for qualifying features of the FFC SPA in 2020 (Natural England, 2020). For gannet, these are:

- Maintain the size of the breeding population at a level which is above 8,469 pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent;
- Maintain safe passage of birds moving between nesting and feeding areas;
- Restrict the frequency, duration and / or intensity of disturbance affecting roosting, nesting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed;
- Restrict predation and disturbance caused by native and non-native predators;
- Maintain concentrations and deposition of air pollutants at below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System;
- Maintain the structure, function and supporting processes associated with the feature and its supporting habitat through management or other measures (whether within and/or outside the site boundary as appropriate) and ensure these measures are not being undermined or compromised;
- Maintain the extent, distribution and availability of suitable breeding habitat which supports the feature for all necessary stages of its breeding cycle (courtship, nesting, feeding) at: current extent;
- Maintain the distribution, abundance and availability of key food and prey items (e.g. herring, mackerel, sprat, sandeel) at preferred sizes;
- Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the Water Framework Directive, avoiding deterioration from existing levels;
- Maintain the dissolved oxygen (DO) concentration at levels equating to High Ecological Status (specifically ≥5.7mg per litre (at 35 salinity) for 95% of the year), avoiding deterioration from existing levels;
- Maintain water quality and specifically mean winter dissolved inorganic nitrogen (DIN) at a concentration equating to High Ecological Status (specifically mean winter DIN is <12µM for coastal waters), avoiding deterioration from existing levels; and
- Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.

5.4 Designated Feature – Guillemot

45. The FFC SPA breeding guillemot population was cited as 41,607 pairs or 83,214 breeding adults, for the period 2008 to 2011 (Natural England, 2018). The most

recent count (in 2017) was 60,877 pairs or 121,754 breeding adults (Aitken *et al*., 2017), which is used as the reference population for the purpose of the **RIAA** [APP-059]. It is clear that the population of guillemot at the FFC SPA has increased between designation and 2017 (Aitken *et al*., 2017; JNCC, 2022), and has increased almost threefold since 1986 (**Plate 5-2**). The average annual increase in the population between 1987 and 2017 was 3.8%, and 4.6% between 2008 and 2017.

46. The baseline mortality of this population is 7,427 adult birds per year based on an adult population of 121,754 individuals and the published adult mortality rate of 0.061 (Horswill and Robinson, 2015).

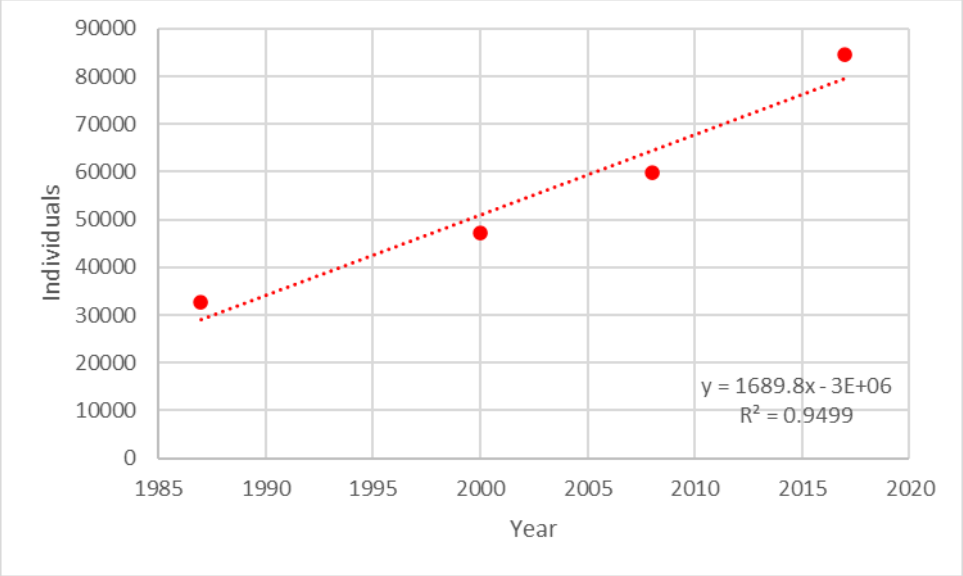


Plate 5-2: Guillemot Counts (Individuals) at the FFC SPA between 1986 and 2017 Included in the Seabird Monitoring Programme (SMP) Database (JNCC, 2022), with Linear Trendline. Note That These Values Have Not Been Corrected to Estimate the Number of Birds Not at the Colony at the Time of the Count, so Do Not Match the Values Given in the Text.

47. Supplementary advice on the conservation objectives were added for qualifying features in 2020 (Natural England, 2020). For guillemot, these are:

- Maintain the size of the breeding population at a level which is above 41,607 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent;
- Maintain safe passage of birds moving between nesting and feeding areas;
- Restrict the frequency, duration and / or intensity of disturbance affecting roosting, nesting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed;
- Restrict predation and disturbance caused by native and non-native predators;

- Maintain concentrations and deposition of air pollutants at below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System;
- Maintain the structure, function and supporting processes associated with the feature and its supporting habitat through management or other measures (whether within and/or outside the site boundary as appropriate) and ensure these measures are not being undermined or compromised;
- Maintain the extent, distribution and availability of suitable breeding habitat which supports the feature for all necessary stages of its breeding cycle (courtship, nesting, feeding) at: current extent;
- Maintain the distribution, abundance and availability of key food and prey items (e.g. sandeel, herring, sprat) at preferred sizes;
- Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the Water Framework Directive, avoiding deterioration from existing levels;
- Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥5.7mg per litre (at 35 salinity) for 95% of the year), avoiding deterioration from existing levels;
- Maintain water quality and specifically mean winter DIN at a concentration equating to High Ecological Status (specifically mean winter DIN is <12µM for coastal waters), avoiding deterioration from existing levels; and
- Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.

5.5 Designated Feature – Razorbill

48. The FFC SPA breeding razorbill population was 10,570 pairs or 21,140 breeding adults, for the period 2008 to 2012 (Natural England, 2018). The most recent count (in 2017) was 20,253 pairs or 40,506 breeding adults (Aitken *et al*., 2017), which is used as the reference population for the **RIAA** [APP-059]. Using the published annual mortality rate of 0.105 (Horswill and Robinson, 2015), 4,253 birds per year would be expected to die each year.

49. The average annual increase in the population between 1987 and 2017 was 5.8%, and 9.7% between 2008 and 2017. It is clear that the population of razorbill at the FFC SPA has increased between designation and 2017 (Aitken *et al.*, 2017; JNCC, 2022), and has increased almost fourfold since 1986 (**Plate 5-3**).

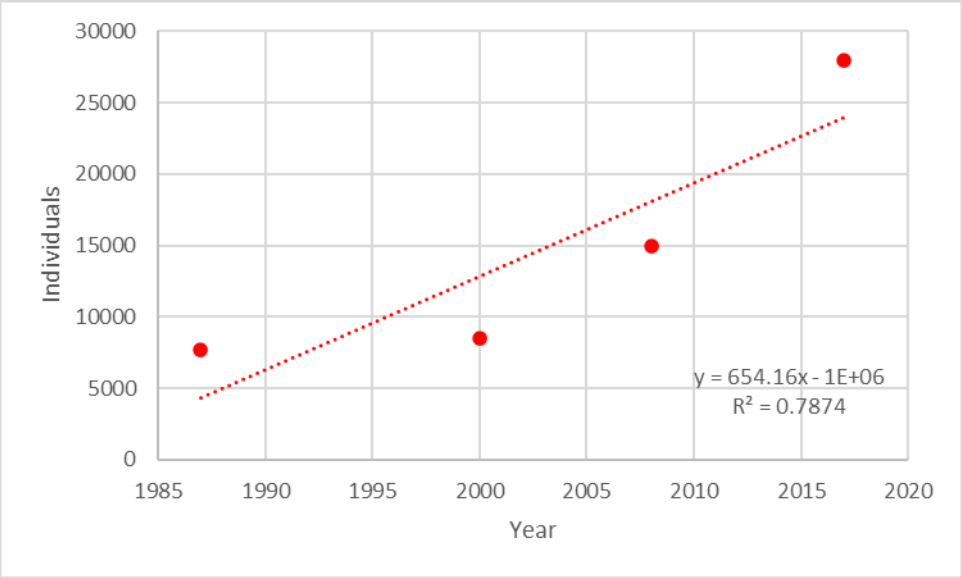


Plate 5-3: Razorbill Counts (Individuals) at the FFC SPA between 1987 and 2017 Included in the SMP Database (JNCC, 2022), with Linear Trendline. Note that these Values Have Not Been Corrected to Estimate the Number of Birds Not at the Colony at the Time of the Count, So Do Not Match the Values Given in the Text.

50. Supplementary advice on the conservation objectives were added for qualifying features in 2020 (Natural England, 2020). For razorbill, these are:

- Maintain the size of the breeding population at a level which is above 10,570 breeding pairs whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent;
- Maintain safe passage of birds moving between nesting and feeding areas;
- Restrict the frequency, duration and / or intensity of disturbance affecting roosting, nesting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed;
- Restrict predation and disturbance caused by native and non-native predators;
- Maintain concentrations and deposition of air pollutants at below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System;
- Maintain the structure, function and supporting processes associated with the feature and its supporting habitat through management or other measures (whether within and/or outside the site boundary as appropriate) and ensure these measures are not being undermined or compromised;
- Maintain the extent, distribution and availability of suitable breeding habitat which supports the feature for all necessary stages of its breeding cycle (courtship, nesting, feeding) at: current extent;

- Maintain the distribution, abundance and availability of key food and prey items (e.g. sandeel, herring, sprat) at preferred sizes;
- Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the Water Framework Directive, avoiding deterioration from existing levels;
- Maintain the DO concentration at levels equating to High Ecological Status (specifically ≥ 5.7mg per litre (at 35 salinity) for 95% of the year), avoiding deterioration from existing levels;
- Maintain water quality and specifically mean winter DIN at a concentration equating to High Ecological Status (specifically mean winter DIN is <12µM for coastal waters), avoiding deterioration from existing levels; and
- Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.

6 Summary of Potential Impacts

51. The following sections provide a summary of the potential impacts on gannet, guillemot and razorbill at FFC SPA in order to set the context for the proposed without prejudice compensatory measures. The SoS will determine the level of effect based on the Appropriate Assessment conclusions for the potential impact of SEP and DEP on the breeding adult birds associated with the FFC SPA. The following section describes the Applicant's position, as set out in the **RIAA** [APP-059] and **Apportioning and Habitats Regulations Assessment Update Technical Note (Revision B)** [REP2-037], which is based on the precautionary estimates derived by following SNCB guidance.

6.1 Gannet

6.1.1 Overview

52. The screening process undertaken in the development of **Environmental Statement (ES) Chapter 11 Offshore Ornithology** [APP-097] has identified gannet as being of medium sensitivity to potential collision with operational offshore wind turbines at SEP and DEP, as well as disturbance and displacement during the operational phase of the Projects. This species is considered to be insensitive to disturbance and displacement impacts during the construction and decommissioning phases, and any indirect impacts that may occur as a result of the construction, operation or decommissioning of SEP and DEP.

53. Breeding adult gannets present at SEP and DEP during the full breeding season (March to September (Furness, 2015)) are therefore assumed to originate from the FFC SPA, even though non-breeding adults from a range of breeding colonies are also likely to be present. In addition, some of the gannets recorded at SEP and DEP during the breeding season will be sub-adult birds. During the full breeding season, 703 gannets were recorded during the baseline surveys of SEP and DEP. Of these,

320 birds were able to be assigned to an age class, and of these, 245 birds (76.6% of those assigned to an age class) were classified as adults. It is therefore assumed that this proportion of gannets recorded at SEP and DEP during the full breeding season are breeding adult birds from the FFC SPA.

54. Outside the breeding season breeding gannets, including those from the FFC SPA, are not constrained by requirements to visit nests to incubate eggs or provision chicks. The background population during these seasons is the UK North Sea and Channel Biologically Defined Minimum Population Scales (BDMPS). This consists of 456,298 individuals during autumn migration (September to November), and 248,385 individuals during spring migration (December to March) (Furness, 2015).

55. During autumn migration, all of the FFC SPA breeding adults are thought to be present in the BDMPS, representing 4.8% of the total BDMPS population (456,298 individuals of all ages). During this season, 458 gannets were recorded during the baseline surveys of SEP and DEP. Of these, 182 birds were able to be assigned to an age class and 170 birds (93.4% of those assigned to an age class) were classified as adults. It is therefore assumed that the proportion of gannets recorded at SEP and DEP during the autumn migration season that are breeding adult birds from the FFC SPA is 4.5% (i.e. 0.048 x 0.934).

56. During spring migration 70% of FFC SPA breeding adults are thought to be present in the BDMPS, representing 6.2% of the BDMPS population (248,385 individuals of all ages). During this season, 28 gannets were recorded during the baseline surveys of SEP and DEP. Of these, 21 birds were able to be assigned to an age class and 20 birds (95.2% of those assigned to an age class) were classified as adults. It is therefore assumed that the proportion of gannets recorded at SEP and DEP during the autumn migration season that are breeding adult birds from the FFC SPA is 5.9% (i.e. 0.062 x 0.952).

6.1.2 Quantification of Effect – Collision and Displacement

57. The potential collision risk for gannet at SEP and DEP was estimated using the Band (2012) collision risk model (CRM). Full details of the input parameters used are provided in the **Appendix 11.1 Offshore Ornithology Technical Report** [APP-196] of the ES and the **Apportioning and HRA Updates Technical Note (Revision B)** [REP2-036]. Updated values for operational collision risk and displacement are presented in the latter document. This includes the application of a 99.2% avoidance rate and 70% macro-avoidance for the collision risk assessment, in accordance with Natural England's advice provided in their Relevant Representation [RR-063].

58. The potential magnitude of operational phase displacement at SEP and DEP was estimated using the matrix-based approach of UK SNCBs (2017). For this species, displacement and mortality rates of 0.600 to 0.800 and 1% respectively were examined by the assessment. The figures presented below assume a displacement rate of 0.700. Full details are provided in **ES Chapter 11 Offshore Ornithology** [APP-097].

6.1.2.1 Project Alone

59. The annual total of gannets from the FFC SPA at risk of mortality due to the combined effects of collision and displacement at SEP and DEP is 2.94 birds (95% CI 1.13 – 5.53); 2.67 (95% CI 1.05 – 4.89) at DEP and 0.27 (95% CI 0.08 – 0.64) at SEP.

60. Annual mortality in the FFC SPA breeding adult gannet population would increase by 0.12% due to impacts at DEP, 0.01% due to impacts at SEP, and 0.14% due to the impacts of SEP and DEP. The upper 95% CI impacts would result in a mortality increase due to collision and displacement of up to 0.25% for SEP and DEP.

61. Increases in the existing mortality rate of less than 1% are likely to be undetectable against natural variation. This means that no detectable changes in mortality rates would occur under any combination of displacement and mortality rates when the mean peak abundance estimate assessments are considered.

62. It is concluded that predicted gannet mortality due to the combined effects of operational phase displacement and collision at DEP, SEP, and SEP and DEP would not adversely affect the integrity of the FFC SPA and therefore this compensation document is provided on a without prejudice basis.

63. The confidence in the assessment is high. The evidence used to define the displacement rates and CRM input parameters presented in **ES Chapter 11 Offshore Ornithology** [APP-097], **Appendix 11.1 Offshore Ornithology Technical Report** [APP-196] and the **Apportioning and HRA Updates Technical Note (Revision B)** [REP2-036] is of high applicability and quality. Whilst there is uncertainty around some of the input parameters (e.g. avoidance and mortality rates), the rates selected are considered to be sufficiently precautionary based on expert opinion to provide confidence that impacts are not underestimated. Finally, the conclusion of the assessment is the same irrespective of whether the mean or 95% upper CI bird densities are used to calculate impacts and increases in the baseline mortality rate of the background population.

64. For the purpose of this compensation document, SNCB guidance is that compensatory measures should be based on the upper 95% CI rates. As such, an annual total mortality for SEP and DEP of up to six birds per year is applied to the measures described in **Section 8** below.

6.1.2.2 In-Combination

65. The estimated annual total of breeding adult gannets from FFC SPA at risk of displacement from all OWFs within the UK North Sea BDMPS combined is 9,113. Of this total, SEP and DEP contribute 0.4% and 3.7% respectively. Using a displacement rate of 0.600 to 0.800 and mortality rates of 1% of displaced birds (UK SNCBs, 2017), the number of FFC SPA birds predicted to die each year would be between 55 and 73. The annual number of adult gannets from the FFC SPA breeding population that are predicted to die each year due to collision is 67.5.

66. The annual combined displacement and collision mortality is 122.5 to 140.5. These mortality levels would increase the existing mortality rate of this population by 5.6% to 6.5%. This magnitude of increase could result in detectable population level effects.

67. Population Viability Analysis (PVAs) investigating the population-level effects of potential displacement impacts for SEP and DEP in-combination with other projects produced a range of median Counterfactual of Growth Rate (CGR) and Counterfactual of Population Size (CPS) values depending on the displacement and mortality rates used to estimate the magnitude of the impact.

68. The PVA investigating the population-level effects of potential collision and displacement impacts for SEP and DEP in-combination with other projects produced a median CGR of 0.993 to 0.994 and a CPS of 0.775 to 0.801. These counterfactuals all assumed a 40-year operational phase

69. The CGR presented indicates that the annual growth rate of the population compared with the baseline, unimpacted scenario would be reduced by 0.6% to 0.7% due to the predicted impacts. The median CPS indicates that after 40 years of operation of SEP and DEP, along with all other OWFs included in the in-combination assessment, the impacted population would be 19.9% to 22.5% smaller than the unimpacted scenario.

70. The impacts predicted at SEP and DEP, in-combination with other projects, will not prevent the majority of the Conservation Objectives from being met. However, there is potential for the Conservation Objective for the gannet population size of the Flamborough and Filey Coast SPA not being met due to the predicted impacts. This is to maintain the size of the breeding population at a level which is above 8,469 pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.

71. Whilst there is no agreed threshold beyond which an effect could or should be considered significant, the median CGR derived from the PVA represents a relatively small change to the growth rate of a population which has seen mean annual population increases of just over 10% over the last three decades, and 4% over the last five years for which data are available (2012 to 2017). The reduction of the population growth rate of 1.8% to 1.9%, or perhaps more realistically, 0.7% to 0.9% (assuming collisions rates corrected for macro-avoidance are more realistic than the uncorrected collision rates), will not result in population decline, but rather a slowing of the population growth rate. Whilst the CPS suggests a large change in population, this is somewhat inevitable over the length of the operational phase, even when the predicted annual impacts appear smaller.

72. Natural England have previously assessed population trends recorded at other gannet colonies (Natural England, 2022b). The average annual growth rate calculated over a period of more than 90 years from colony establishment is 1.8%. The mean annual growth rate over the most recent years of their records (80+ years) has been 1.2% per annum (or 1.3% excluding Sula Sgeir, as the growth rate is likely to be influenced by an annual licenced harvest of young birds). At present,

Flamborough and Filey Coast SPA growth rates are substantially greater than this (12% between 1985 and 2017, and 4% between 2012 and 2017).

73. The Flamborough and Filey Coast SPA gannet population is believed to be robust enough to allow the conservation objective to maintain the population at (or above) designation levels and sustain the level of additional mortalities predicted (details in the **RIAA** ([APP-059])). At an annual growth rate of 2% or more per annum over the coming decades, the integrity of the site for this feature is high, with high rates for self-repair, and self-renewal under dynamic conditions with minimal external management. In addition, the colony would remain at a size greater than the 8,469 pairs or 16,938 adults required by the population size Conservation Objective.

74. The combined displacement and collision impacts predicted at SEP and DEP, in-combination with other projects, will not prevent all of the other Conservation Objectives from being met.

75. It is concluded that predicted gannet mortality due to the combined impacts of operational phase displacement and collision at DEP, SEP, and SEP and DEP, in-combination with other projects, would not adversely affect the integrity of the Flamborough and Filey Coast SPA and therefore this compensation document is provided on a without prejudice basis.

6.2 Deadline 3 Summary of the Potential Impacts and Compensation Requirement for Guillemot and Razorbill

76. The project-alone calculations for guillemot are unchanged from those in the **Report to Inform Appropriate Assessment (RIAA)** [APP-059]. The **Apportioning and HRA Updates Technical Note (Revision B)** [REP2-036] provides updated calculations of in-combination mortality for guillemot, and project-alone and in-combination mortality for razorbill. SEP and DEP's contribution to the in-combination effect on the guillemot and razorbill features of the FFC SPA is small, with year round mean mortalities of 4 and 1 respectively (when applying 50% displacement and 1% mortality rates) (**Table 6-1**). The Applicant acknowledges that Natural England favour a range-based approach when determining the potential displacement effects on guillemot and razorbill and have suggested that for sites such as SEP and DEP, which occupy a less important sea area for auks from FFC SPA than, for example, Hornsea Project Four (HP4), a 70% displacement and 2% mortality rate is appropriate [HP4 REP7-104, p47]. However, should compensatory measures for auks be deemed to be required by the SoS, the Applicant strongly advocates for the required levels of compensation to be based on 50% displacement and 1% mortality, which it considers to be evidence-based and suitably precautionary. Evidence to support the use of 50% displacement and 1% mortality is presented in the **RIAA** ([APP-059]; Paragraphs 1518-1519).

77. For clarity, the key calculations from the guillemot and razorbill displacement assessments and the level of compensation that might be required are provided in **Table 6-1**. If auk compensation is deemed to be required by the SoS, the Applicant has agreed, as for Sandwich tern and kittiwake, to base the required levels of compensation on the 95% upper confidence limit (6 adult guillemot and 3 adult

razorbill based on 50% displacement 1% mortality). However, it should be noted that this is a precautionary approach. The Applicant does not anticipate a further update to these calculations within the timeframe of the Examination.

78. **Table 6-1** presents the predicted year-round SEP and DEP upper 95% CI, mean, and lower 95% CI guillemot and razorbill mortalities based on various displacement and mortality rates as follows:

- Lower end rates (30%, 1%);
- Applicant's preferred evidence-based and suitably precautionary rates (50%, 1%);
- Natural England's recommended rates for projects not in an area where auks are particularly sensitive i.e. SEP and DEP (70%, 2%);
- Natural England's recommended rates for HP4 (70%, 5%); and
- Extreme worst case (70%, 10%).

79. If the SoS determines that compensation is required, then the numbers coloured red in **Table 6-1** represent what the Applicant considers to be the Applicant's (50% displacement 1% mortality) and Natural England's (70% dis[placement 2% mortality) current positions on an appropriately precautionary calculation of displacement and mortality. The Applicant anticipates that the SoS would quantify the scale of compensation required based on these calculations.

80. Further information on the assessment of displacement effects for guillemot and razorbill is presented below, in **Sections 6.2.1** and **6.2.2** respectively.

Table 6-1: Predicted year round SEP and DEP guillemot and razorbill mortalities

Variable	30% displacement, 1% mortality	50% displacement, 1% mortality	70% displacement, 2% mortality	70% displacement, 5% mortality	70% displacement, 10% mortality
Guillemot					
Upper 95% CI	3	6	16	40	80
Mean	2	4	10	25	49
Lower 95% CI	1	2	5	13	26
Razorbill					
Upper 95% CI	2	3	7	18	35
Mean	1	1	4	11	21
Lower 95% CI	0	1	2	5	9

6.2.1 Guillemot

6.2.1.1 Overview

81. The screening process undertaken in the development of **ES Chapter 11 Offshore Ornithology** [APP-097] has identified guillemot as being of medium sensitivity to potential disturbance and displacement during the operational phase of the Projects. Whilst also of medium sensitivity to disturbance and displacement impacts during the construction and decommissioning phases, the possibility of likely significant effect (LSE) was excluded during HRA screening. This species is considered to be insensitive to collision with turbines during the operational phase, and any indirect impacts that may occur as a result of the construction, operation or decommissioning of SEP and DEP.

82. The assessment assumes that birds recorded at SEP and DEP during the breeding season are non-breeding adults and sub-adult birds which have not yet reached breeding age. This may include birds from FFC SPA and other breeding colonies, but no breeding adult birds from the FFC SPA.

83. Outside the breeding season, the relevant non-breeding season reference population is the UK North Sea and Channel BDMPS, consisting of 1,617,306 individuals (August to February) (Furness, 2015). During the non-breeding season, it is estimated that 4.4% of birds present are considered to be breeding adults from the FFC SPA.

6.2.1.2 Quantification of Effect – Displacement

84. The potential magnitude of operational phase displacement at SEP and DEP was estimated using the matrix-based approach of UK SNCBs (2017). For this species, displacement and mortality rates of 30% to 70% and 1% to 10% respectively were examined by the assessment, with evidence-based displacement and mortality rates of 50% and 1% being recommended. Full details are provided in **ES Chapter 11 Offshore Ornithology** [APP-097] and updated in the **Apportioning and HRA Updates Technical Note (Revision B)** [REP2-036].

6.2.1.2.1 Project Alone

85. Based on the mean peak abundances, the annual total of guillemots from the FFC SPA at risk of displacement from SEP and DEP is 703 birds; 655 at DEP and 48 at SEP. At displacement rates of 0.300 to 0.700, and mortality rates of 1% to 10% for displaced birds, 2.0 to 45.9 SPA breeding adults would be predicted to die each year due to displacement from DEP, and 0.1 to 3.3 birds due to displacement from SEP.

86. Assuming a displacement rate of 0.700 and a mortality rate of 10% of displaced birds, annual mortality within this population would increase by 0.62% due to impacts at DEP, and 0.04% due to impacts at SEP (0.66% due to SEP and DEP). Using an evidence-based displacement rate of 0.500, and a mortality rate for displaced birds of 1%, annual mortality in the FFC SPA breeding adult guillemot

population would increase by 0.05% due to impacts at DEP (3.3 birds), <0.01% due to impacts at SEP (0.2 birds), and 0.05% due to the impacts of SEP and DEP (3.5 birds).

87. Increases in the existing mortality rate of less than 1% are likely to be undetectable against natural variation. This means that no detectable changes in mortality rates would occur under any combination of displacement and mortality rates when the mean peak abundance estimate assessments are considered.

88. It is concluded that predicted guillemot mortality due to operational phase displacement at DEP, SEP, and SEP and DEP would not adversely affect the integrity of the FFC SPA.

89. The confidence in the assessment is high for several reasons. Firstly, the evidence used to inform the evidence-based displacement rates is of high applicability and quality (based on the criteria discussed in **ES Chapter 11 Offshore Ornithology** [APP-097]). Whilst there is limited available evidence to inform mortality rates, 1% is considered to be sufficiently precautionary based on expert opinion. This species is not regarded as being highly specialised in its habitat requirements (Bradbury *et al.*, 2014; Furness and Wade, 2012; Garthe and Hüppop, 2004), and it is therefore anticipated that displaced birds will find alternative habitat in the vast majority of cases. Finally, the conclusion of the assessment is the same irrespective of whether the mean or 95% upper CI mean peak abundances are used to calculate potential mortality and increases in the baseline mortality rate of the background population, provided the evidence-based displacement and mortality rates are used.

90. For the purpose of this compensation document, an annual total mortality for SEP and DEP of up to 6 birds per year (based on the 95% upper CI mean peak abundances, and the evidence-based displacement rate of 0.500, and a mortality rate for displaced birds of 1% described above) is applied to the measures described in **Section 7** below.

6.2.1.2.2 In-Combination

91. The estimated annual total of breeding adult guillemots from FFC SPA at risk of displacement from all OWFs within the UK North Sea BDMPS combined is 36,336. Of this total, SEP and DEP contribute 0.1% and 1.8% respectively. Using displacement rates of 0.300 to 0.700 and mortality rates of 1% to 10% of displaced birds (UK SNCBs, 2017), the number of FFC SPA birds predicted to die each year would be between 109 to 2,543. Refer to the **Apportioning and HRA Updates Technical Note (Revision B)** [REP2-036] for further information.

92. The estimated increase in mortality of FFC SPA breeding adult guillemot due to in-combination displacement impacts is between 1.47% and 34.24%. Increases in the existing mortality rate of greater than 1% could be detectable against natural variation.

93. Population Viability Analysis (PVAs) investigating the population-level effects of potential displacement impacts for SEP and DEP in-combination with other projects

produced a wide range of median CGR and CPS values depending on the displacement and mortality rates used to estimate the magnitude of the impact.

94. At the upper end of the displacement and mortality rates examined (0.700 displacement and 10% mortality of displaced birds), the median CGR when impacts from all OWFs in Tiers 1-5 (including SEP and DEP, see the **Apportioning and HRA Updates Technical Note (Revision B)** [REP2-036] for further details) were included was 0.977 and a CPS of 0.379. At the lower end of the displacement and mortality rates examined (0.300 displacement and 1% mortality of displaced birds), the median CGR when impacts from all OWFs in Tiers 1-5 (including SEP and DEP) were included was 0.999 and a CPS of 0.960. Using the evidence-based displacement and mortality rates of 0.500 displacement and 1% mortality of displaced birds, the median CGR when impacts from all OWFs in Tiers 1-5 (including SEP and DEP) were included was 0.998 and a CPS of 0.934.

95. The counterfactuals calculated from the model outputs should be interpreted according to the level of precautionary assumptions made both within the PVAs themselves, and the processes that were undertaken to produce the inputs into the PVAs. These include:

- The use of mean peak abundance estimates in displacement modelling may result in estimates of displaced birds being unrealistically high;
- The upper range of displacement rates considered may be overestimated;
- The mortality rates assumed for displaced birds may be overestimated;
- The PVA does not incorporate density dependence, which means the outputs of the model are likely to be precautionary; and
- The FFC SPA guillemot population is modelled as a closed population, with no emigration or immigration occurring.

96. The impacts predicted at SEP and DEP, in-combination with other projects, will not prevent the majority of the Conservation Objectives from being met. However, there is potential for the Conservation Objective for the guillemot population size of the FFC SPA not being met due to the predicted impacts. This is to maintain the size of the breeding population at a level which is above 41,607 pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.

97. The guillemot population of the FFC SPA increased on average by 3.8% annually between 1986 and 2017. Between 2008 and 2017, the annual growth rate increased to 4.6%. Whilst this is no guarantee of the future population trend of the colony, it might be the case that scenarios where the CGR is sufficiently low may result in a reduction in the growth rate of the colony, rather than recent trends reversing, and the population going into decline. The Conservation Objective for population size could therefore be met despite the predicted in-combination impacts.

98. The mortality rates presented in the PVA within the **Apportioning and HRA Updates Technical Note (Revision B)** [REP2-036] are lower than those originally presented in the **RIAA** [APP-059]. Therefore, the slowing of population increase

would be slightly less (i.e. the population reduction would be less marked) than presented in the RIAA, and its conclusions would be unaffected. If the FFC SPA guillemot population continues to increase at a rate of 3.8% annual growth for the next 40 years, as it did between 1986 and 2017, none of the 20 displacement and mortality combinations considered (see the **RIAA** [APP-059] for further details) would cause the population to decline. Instead, the growth rate would decrease in all scenarios. Even in scenarios where the growth rate of the FFC SPA guillemot colony is considerably reduced from levels recorded between 1986 and 2017 (1.90%, 0.95% and 0.48%), the application of appropriately precautionary levels of displacement and mortality of displaced birds indicate that a slowing of the population growth rate, rather than a population decline, is likely as a result of in-combination displacement effects. This is particularly true when evidence-based displacement and mortality rates of 50% and 1% are used to predict population level effects. Whilst the CPSs generated from the PVA outputs suggest a large change in population at the end of the operational period, this is somewhat inevitable over the length of the operational phase, even when the predicted annual impacts appear smaller. The colony would remain at a size greater than the 41,607 pairs or 83,214 adults required by the population size Conservation Objective.

99. The displacement impacts predicted at SEP and DEP, in-combination with other projects, will not prevent all of the other Conservation Objectives from being met. It is concluded that predicted guillemot mortality due to of operational phase displacement impacts at DEP, SEP, and SEP and DEP, in-combination with other projects, would not adversely affect the integrity of the FFC SPA.

6.2.2 Razorbill

6.2.2.1 Overview

100. The screening process undertaken in the development of **ES Chapter 11 Offshore Ornithology** [APP-097] has identified guillemot as being of medium sensitivity to potential disturbance and displacement during the operational phase of the Projects. Whilst also of medium sensitivity to disturbance and displacement impacts during the construction and decommissioning phases, the possibility of LSE was excluded during HRA screening. This species is considered to be insensitive to collision with turbines during the operational phase, and any indirect impacts that may occur as a result of the construction, operation or decommissioning of SEP and DEP.

101. The assessment assumes that birds recorded at SEP and DEP during the breeding season are non-breeding adults and sub-adult birds which have not yet reached breeding age. This may include birds from FFC SPA and other breeding colonies, but no breeding adult birds from the FFC SPA.

102. Outside the breeding season, the relevant background population is considered to be the UK North Sea and Channel BDMPS, consisting of 591,874 individuals during autumn and spring passage periods (August to October and January to March), and 218,622 individuals during winter (November and December) (Furness, 2015).

103. During autumn and spring migration, 100% of the SPA breeding adults (20,002 individuals based on the 2008 population estimate) are assumed to be present in the BDMPS, representing 3.4% of the BDMPS population (591,874 individuals of all ages). During the winter season, 30% of the SPA breeding adults (6,001 individuals based on the 2008 population estimate) are assumed to be present in the BDMPS, representing 2.7% of the BDMPS population (218,622 individuals of all ages). These percentages (i.e. 3.4% and 2.7%) are the proportions of birds present at SEP and DEP that are presumed to originate from the FFC SPA during the relevant seasons.

6.2.2.2 Quantification of Effect – Displacement

104. The potential magnitude of operational phase displacement at SEP and DEP was estimated using the matrix-based approach of UK SNCBs (2017). For this species, displacement and mortality rates of 30% to 70% and 1% to 10% respectively were examined by the assessment, with evidence-based displacement and mortality rates of 50% and 1% being recommended. Full details are provided in **ES Chapter 11 Offshore Ornithology** [APP-097] and updated in the **Apportioning and HRA Updates Technical Note (Revision B)** [REP2-036] .

6.2.2.2.1 Project Alone

105. Based on the mean peak abundances, the annual total of razorbills from the FFC SPA at risk of displacement from SEP and DEP is 296 birds; 225 at DEP and 71 at SEP. At displacement rates of 0.300 to 0.700, and mortality rates of 1% to 10% for displaced birds, 0.7 to 15.7 SPA breeding adults would be predicted to die each year due to displacement from DEP, and 0.2 to 5.0 birds due to displacement from SEP.

106. Assuming a displacement rate of 0.700 and a mortality rate of 10% of displaced birds, annual mortality within this population would increase by 0.37% due to impacts at DEP, and 0.12% due to impacts at SEP (0.49% due to SEP and DEP). Using an evidence-based displacement rate of 0.500, and a mortality rate for displaced birds of 1%, annual mortality in the FFC SPA breeding adult razorbill population would increase by 0.03% due to impacts at DEP (1.1 birds), 0.01% due to impacts at SEP (0.4 birds), and 0.03% due to the impacts of SEP and DEP (1.5 birds).

107. Increases in the existing mortality rate of less than 1% are likely to be undetectable against natural variation. This means that no detectable changes in mortality rates would occur under any combination of displacement and mortality rates when the mean peak or upper 95% CIs for mean peak abundance estimate assessments are considered.

108. It is concluded that predicted razorbill mortality due to operational phase displacement at DEP, SEP, and SEP and DEP would not adversely affect the integrity of the FFC SPA.

109. The confidence in the assessment is high for several reasons. Firstly, the evidence used to inform the evidence-based displacement rates is of high applicability and quality (based on the criteria discussed in **ES Chapter 11 Offshore Ornithology**

([APP-097])). Whilst there is limited available evidence to inform mortality rates, 1% is considered to be sufficiently precautionary based on expert opinion. This species is not regarded as being highly specialised in its habitat requirements (Bradbury *et al*., 2014; Furness and Wade, 2012; Garthe and Hüppop, 2004), and it is therefore anticipated that displaced birds will find alternative habitat in the vast majority of cases. Finally, the conclusion of the assessment is the same irrespective of whether the mean or 95% upper CI mean peak abundances are used to calculate potential mortality and increases in the baseline mortality rate of the background population, provided the evidence-based displacement and mortality rates are used.

110. For the purpose of this compensation document, an annual total mortality for SEP and DEP of up to 3 birds per year (based on the 95% upper CI mean peak abundances, and evidence-based displacement rate of 0.500, and a mortality rate for displaced birds of 1% described above) is applied to the measures described in **Section 7** below.

6.2.2.2.2 In-Combination

111. The estimated annual total of breeding adult razorbills from FFC SPA at risk of displacement from all OWFs within the UK North Sea BDMPS combined is 6,978. Of this total, SEP and DEP contribute 1.0% and 3.2% respectively. Using displacement rates of 0.300 to 0.700 and mortality rates of 1% to 10% of displaced birds (UK SNCBs, 2017), the number of FFC SPA birds predicted to die each year would be between 21 to 488. Refer to the **Apportioning and HRA Updates Technical Note (Revision B)** [REP2-036] for further information.

112. The estimated increase in mortality of FFC SPA breeding adult razorbill due to in-combination displacement impacts is between 0.49% and 11.48%. Increases in the existing mortality rate of greater than 1% could be detectable against natural variation.

113. PVAs investigating the population-level effects of potential displacement impacts for SEP and DEP in-combination with other projects produced a wide range of median CGR and CPS values depending on the displacement and mortality rates used to estimate the magnitude of the impact.

114. At the upper end of the displacement and mortality rates examined (0.700 displacement and 10% mortality of displaced birds), the median CGR when impacts from all OWFs in Tiers 1-5 (including SEP and DEP) (see the **Apportioning and HRA Updates Technical Note (Revision B)** [REP2-036] for further details) were included was 0.986 and a CPS of 0.556. At the lower end of the displacement and mortality rates examined (0.300 displacement and 1% mortality of displaced birds), the median CGR when impacts from all OWFs in Tiers 1-5 (including SEP and DEP) were included was 0.999 and a CPS of 0.975. Using the evidence-based displacement and mortality rates of 0.500 displacement and 1% mortality of displaced birds, the median CGR when impacts from all OWFs in Tiers 1-5 (including SEP and DEP) were included was 0.999 and a CPS of 0.959.

115. The counterfactuals calculated from the model outputs should be interpreted according to the level of precautionary assumptions made both within the PVAs

themselves, and the processes that were undertaken to produce the inputs into the PVAs. These include:

- The use of mean peak abundance estimates in displacement modelling may result in estimates of displaced birds being unrealistically high;
- The upper range of displacement rates considered may be overestimated;
- The mortality rates assumed for displaced birds may be overestimated;
- The PVA does not incorporate density dependence, which means the outputs of the model are likely to be precautionary; and
- The FFC SPA razorbill population is modelled as a closed population, with no emigration or immigration occurring.

116. The impacts predicted at SEP and DEP, in-combination with other projects, will not prevent the majority of the Conservation Objectives from being met. However, there is potential for the Conservation Objective for the razorbill population size of the FFC SPA not being met due to the predicted impacts. This is to maintain the size of the breeding population at a level which is above 10,570 pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.

117. The mortality rates presented in the PVA within the **Apportioning and HRA Updates Technical Note (Revision B)** [REP2-036] are lower than those originally presented in the **RIAA** [APP-059]. Therefore, the slowing of population increase would be slightly less (i.e. the population reduction would be less marked) than presented in the RIAA, and its conclusions would be unaffected. Even in scenarios where the growth rate of the FFC SPA razorbill colony is considerably reduced from levels recorded between 1986 and 2017 (2.9%, 1.45% and 0.73%), the application of appropriately precautionary levels of displacement and mortality of displaced birds indicate that a slowing of the population growth rate, rather than a population decline, is likely as a result of in-combination displacement effects. Whilst the CPSs generated from the PVA outputs suggest a large change in population at the end of the operational period, this is somewhat inevitable over the length of the operational phase, even when the predicted annual impacts appear smaller. The colony would remain at a size greater than the 20,253 pairs or 40,506 adults required by the population size Conservation Objective.

118. The displacement impacts predicted at SEP and DEP, in-combination with other projects, will not prevent all of the other Conservation Objectives from being met. It is concluded that predicted razorbill mortality due to of operational phase displacement impacts at DEP, SEP, and SEP and DEP, in-combination with other projects, would not adversely affect the integrity of the FFC SPA.

7 Compensatory Measures

7.1 Potential Measures Considered

119. Potential compensatory measures for gannet, guillemot and razorbill were considered in the 'Initial Review of Compensatory Measures for Gannet, Guillemot and Razorbill' document (included at **Annex 1C Initial Review of Compensatory Measures for Gannet, Guillemot and Razorbill** [APP-067]), consulted on with the ETG in November 2021 (see **Annex 1D Record of HRA Derogation Consultation** [APP-068]). This built on the measures that had been identified in Furness *et al*. (2013), the more recent MacArthur Green (2021) report to Crown Estate Scotland and Scottish Offshore Wind Energy Council (SOWEC), as well as measures put forward by other recent OWF projects.

120. For gannet these were:

- Ending licensed harvesting of chicks;
- Measures to encourage establishment of new colonies;
- Mortality reduction at existing colonies; and
- Fishery bycatch prevention.

121. For guillemot and razorbill these were:

- Fisheries management (prey enhancement);
- Funding research into alternative food sources for the industries that sandeel and sprat are fished for;
- Oil spill prevention;
- Predator eradication from a breeding colony; and
- Fishery bycatch prevention.

122. From the evidence in Furness *et al*. (2013) and MacArthur Green (2021) in the context of FFC SPA and more recent literature, it was considered by the Applicant at this stage that the following potential compensatory measures could be taken forward with respect to SEP and DEP (see **Annex 1C Initial Review of Compensatory Measures for Gannet, Guillemot and Razorbill** [APP-067]:

- Gannet:
    - measures to encourage establishment of new colonies; and
    - fishery bycatch prevention/reduction.
- Guillemot and razorbill:
    - predator eradication from a breeding colony; and
    - fishery bycatch prevention/reduction.

123. Prey enhancement was also identified as being potentially suitable for guillemot and razorbill at this stage, but was not short listed as a project-led measure, recognising

that it would need to be delivered as part of a strategic approach by Government and industry. Despite this, the Applicant engaged with Defra, and latterly with the OWIC Derogation Subgroup, to explore how such strategic measures could be taken forward. Further details are presented in the **Strategic and Collaborative Approaches to Compensation and Measures of Equivalent Environmental Benefit** [APP-084] and **Habitats Regulations Assessment Derogation and Compensatory Measures Update (Revision B)** [document reference 13.7].

124. Subsequent to discussions with stakeholders in the January 2022 ETG (see **Annex 1D Record of HRA Derogation Consultation** [APP-068]) alongside the emerging outcomes from other OWF projects, the development of the compensatory measures was refocussed on a proposed non like-for-like option for gannet; and prey enhancement (on a strategic basis), fishery bycatch reduction and predator eradication for guillemot and razorbill.

125. Further feedback from ETG members in April 2022 indicated a preference for a species-specific measure for gannet over a non like-for-like option (see **Annex 1D Record of HRA Derogation Consultation** [APP-068]). As a result the following measures were taken forward for further development:

- Gannet:
  - A non like-for-like option, through the establishment of an inland pool or pontoon to enhance the conservation of wintering and migrant shorebirds and waterfowl and provide safe nesting sites for a variety of species that are otherwise unable to breed successfully; and
  - Bycatch reduction research proposal – to better establish the scale and pattern of bycatch and investigate reduction measures.
- Guillemot and razorbill:
  - Prey enhancement through sandeel stock recovery and ecosystem-based management (on a strategic basis);
  - Fishery bycatch reduction (on a project-led or collaborative basis); and
  - Predator eradication from a breeding colony (on a collaborative basis).

126. The discussions with both Natural England and RSPB in the ETG meetings confirmed that there were no other alternative measures to the ones already identified by the Applicant that could have been considered at this stage (see **Annex 1D Record of HRA Derogation Consultation** [APP-068]).

127. The compensatory measures were considered in the context of different delivery models, including strategic, collaborative and project-led measures. The delivery models reflect how the Applicant considers each measure could be most feasibly, effectively and proportionately delivered, relative to the Projects' predicted impacts. Of the potential SEP and DEP compensatory measures considered further:

- With respect to gannet, both of the proposed measures are considered by the Applicant to be suitable for project-led delivery, although the potential to collaborate with other OWF projects, academics and potentially government on the bycatch reduction research proposal is also recognised. Further details on the proposed collaborative delivery model are set out in the **Strategic and Collaborative Approaches to Compensation and Measures of Equivalent Environmental Benefit** [APP-084] and **Habitats Regulations Assessment Derogation and Compensatory Measures Update (Revision B)** [document reference 13.7]. Draft DCO wording with respect to the proposed compensatory measures for gannet is provided within the **Proposed Without Prejudice DCO Drafting (Revision B)** [REP2-011].
- With respect to guillemot and razorbill:
    - Prey enhancement is considered by the Applicant to be the most effective means of increasing breeding success and therefore populations of these species. This is evidenced by information presented in **Annex 1C Initial Review of Compensatory Measures for Gannet, Guillemot and Razorbill** [APP-067]and **Section 9.1.1** below. However as stated above and in **Section 9.1.2**, this would necessitate, for example, a decision by Defra to legislate to reduce fishing pressure on sandeels in UK waters as strategic compensation for offshore wind, for which there is currently no agreed mechanism for delivery and which may not be achievable within the necessary timeframes for SEP and DEP. Given the huge potential of such an action to provide far greater compensation than even the most precautionary estimates of losses incurred due to SEP and DEP and offshore wind in total, prey enhancement is included as a key part of the Applicant's proposals for compensation, but as a measure requiring strategic delivery. Nonetheless, a option for the Applicant to pay a financial contribution towards the establishment of prey enhancement as a strategic compensation measure or as an adaptive management measure (should a mechanism become available within the necessary timescales for SEP and DEP) has been included within draft DCO wording provided in the **Proposed Without Prejudice DCO Drafting (Revision B)** [REP2-011]. Further details with respect to this are set out in the **Strategic and Collaborative Approaches to Compensation and Measures of Equivalent Environmental Benefit** [APP-084] **Habitats Regulations Assessment Derogation and Compensatory Measures Update (Revision B)** [document reference 13.7].
    - Fishery bycatch reduction (in this case associated with gillnet fisheries) is considered by the Applicant to be the most suitable measure for project-led delivery and is described in detail in **Section 7**. However the Applicant is aware that other developers have proposed and/or are in the process of implementing similar measures. As such this measure has also been identified by the Applicant as having the potential to be delivered as part of a collaborative delivery model, whereby the Applicant would seek to deliver this

measure as compensation or adaptive management through a partnership arrangement with one or more other OWF developers. This represents an alternative option that would be delivered wholly or partly in place of the other compensatory measures proposed. To ensure this option is available to SEP and DEP, the Applicant has included wording to this effect within draft DCO wording provided in the **Proposed Without Prejudice DCO Drafting (Revision B)** [REP2-011]. Further details are set out in the **Strategic and Collaborative Approaches to Compensation and Measures of Equivalent Environmental Benefit** [APP-084] and **Habitats Regulations Assessment Derogation and Compensatory Measures Update (Revision B)** [document reference 13.7].

- Predator eradication from a breeding colony has not been developed by the Applicant as a project-led measure, however as with bycatch reduction, the Applicant is aware that other developers have proposed and/or are in the process of implementing similar measures and has therefore identified this measure as having the potential to be delivered (as either compensation or adaptive management) as part of a collaborative delivery model. This represents an alternative option that would be delivered wholly or partly in place of the other compensatory measures proposed. To ensure this option is available to SEP and DEP, the Applicant has included wording to this effect within the draft DCO wording provided in the **Proposed Without Prejudice DCO Drafting (Revision B)** [REP2-011]. Further details are set out in the **Strategic and Collaborative Approaches to Compensation and Measures of Equivalent Environmental Benefit** [APP-084] and **Habitats Regulations Assessment Derogation and Compensatory Measures Update (Revision B)** [document reference 13.7].

128. **Table 7-1** provides a summary of the compensatory measures identified for gannet, guillemot and razorbill alongside the intended delivery model. A summary of the measures discounted and the rationale for this is provided in **Section 7.2**.

Table 7-1: Summary of Compensatory Measures for Gannet, Guillemot and Razorbill and Delivery Model

Feature	Measure	Project-led	Collaborative	Strategic
Gannet	Enhance the conservation of wintering and migrant shorebirds and waterfowl (non like-for-like compensation option)	X		
	Bycatch reduction research proposal – better establish the scale and pattern of bycatch and investigate reduction measures	X	X	
Guillemot and razorbill	Prey enhancement through sandeel stock recovery and ecosystem-based management			X

Feature	Measure	Project-led	Collaborative	Strategic
	Fishery bycatch reduction	X	X	
	Predator eradication from a breeding colony		X	

129. As outlined in **Strategic and Collaborative Approaches to Compensation and Measures of Equivalent Environmental Benefit** [APP-084], the Applicant has also included within the draft DCO wording provided in the **Proposed Without Prejudice DCO Drafting (Revision B)** [REP2-011] the option for a contribution to be made to a Strategic Compensation Fund wholly or partly in place of the Applicant's proposed measures outlined in **Table 7-1** or as an adaptive management measure. This has been included in light of the emerging Offshore Wind Environmental Improvement Package and Marine Recovery Fund which is expected to provide a viable strategic compensation funding mechanism within the necessary timescales for SEP and DEP and therefore could be relied upon to discharge its derogation requirements.

7.2 Summary of Discounted Measures and Rationale

130. For completeness, **Table 7-2** provides a summary of all of the gannet, guillemot and razorbill measures that have been considered by the Applicant during the pre-application process, but that were discounted, accounting for the feedback received from stakeholders (also see **Annex 1D Record of HRA Derogation Consultation** [APP-068]).

Table 7-2: Gannet, Guillemot and Razorbill Discounted Measures and Rationale

Feature	Measure	Details	Rationale for discounting
Gannet	Ending/reduced licensed harvesting of chicks	Pay harvesters to ring gannets to improve scientific knowledge of gannet movements and survival, rather than kill them, or to reduce the size of the harvest. Alternatively, the regulator to implement a reduction in the size of the quota permitted.	- Cultural barriers and community opposition; and - Not considered feasible for an OWF project to deliver – regulatory action required.
	Measures to encourage establishment of new colonies	Given an appropriate location, a colony could potentially be established further south on the English North Sea coast (e.g. Norfolk or Suffolk).	- In the North Sea, the only gannet colony located further south than FFC SPA is on Helgoland, in German waters. - There is a lack of evidence to support the likelihood of success of such measures for gannet and Natural England has indicated in ETG meetings that it does not support the concept.
	Mortality and/or disturbance reduction at existing colonies	- Removal of hazardous objects at the Bass Rock colony to reduce bird strike & entrapment; - Management of visitor pressure at Bass Rock; and - Reduction in the entanglement of gannets in salmon aquaculture netting.	- Issues with implementation at Bass Rock (activities unable to be undertaken safely or without significant disturbance to birds and unlikely to receive support from local stakeholders or Marine Scotland). - In the case of entanglement in aquaculture netting, likely to be addressed through adherence to best practice guidance rather than providing an opportunity for compensation.
	Bycatch prevention *through implementation* of fisheries based measures	Bycatch of gannets could be reduced by implementation of bird scaring lines, water sprayers, increased line weight, and nocturnal setting in long-line fisheries where gannet bycatch is occurring.	- Reducing bycatch of gannets by UK vessels in UK waters is unlikely to provide good prospects for compensation, as numbers caught are low or moderate but highly uncertain and across many fishing vessels in different locations and fisheries. - Larger numbers are taken in long-line fisheries in southern Europe (and also west Africa), but delivery of this measure in Europe would require agreement with the EU Common Fisheries Policy to implement a management regulation that longline fisheries in EU waters should limit setting of demersal long-lines to night time in order to reduce bycatch of gannets. This would

Feature	Measure	Details	Rationale for discounting
			require EU action (which may be additionally challenging post-Brexit) and/or a strategic response. As such, the *implementation* of bycatch prevention measures is discounted, but bycatch prevention is included in the Applicant's proposals as a *research proposal*, to better establish the scale and pattern of bycatch and investigate reduction measures (with the research having the potential to help unlock opportunities for strategic action, but with implementation being subject to government/EU intervention).
	Reduce hunting of adult gannets at sea	Reduce harvest of adult gannets in either West Africa or Iceland.	- Lack of existing regulation and monitoring; and - Not considered feasible for an OWF project to deliver – regulatory action required.
Guillemot and razorbill Gannet, guillemot and razorbill	Prey enhancement	Funding research into alternative food sources for the industries that sandeel and sprat are fished for.	Not considered feasible and low likelihood of success in required timescales.
	Mortality reduction	Oil spill prevention	- It is considered likely that this measure would benefit these species, but considerable efforts are already made to avoid oil spills. - It is not known what further steps could be taken in order to secure this as compensation for OWF impacts.
Gannet, guillemot and razorbill	Reduced recreational disturbance at the breeding colony to improve productivity	Engage with other users of the area including sailing and water sports clubs, associations and individuals to reduce disturbance and/or provide funding to increase warden presence during the breeding season to help manage and monitor visitors and associated activities.	No additionality: identified as a possible management measure by both Natural England and RSPB.

8 Measures Taken Forward – Gannet

8.1 Enhance the Conservation of Wintering and Migrant Shorebirds and Waterfowl at Loch Ryan, Scotland (Non Like-for-Like Compensation)

8.1.1 Overview

131. Viable compensation options for gannet are hard to identify, are not straightforward to apply and/or questions remain as to how likely they are to be successful (**Section 7.1** and **Section 7.2**). Other OWF developers have also struggled to find suitable potential compensatory measures for gannet.

132. In addition, every gannet population that is a breeding feature of a UK SPA is considered to be in favourable conservation status. Breeding numbers of gannets within the UK national site network have increased since site designation by at least 90,000 pairs. This leaves very little scope for compensation of impacts on gannets.

133. As such, alongside the proposed bycatch research proposal set out in **Section 8.2**, the Applicant considers that a non like-for-like approach may be applied with respect to gannet. The draft Defra (2021b) best practice guidance includes as an example of Step 4 of its suggested hierarchy of compensation measures (comparable ecological function different location): "*measures to enhance population of a different protected seabird species in a different location to where the impact has occurred*" and "*the creation of a wetland reserve that cannot reproduce the same features but mitigates for some loss in biodiversity*". Through pre-application engagement with Defra, the Applicant has been assured that this level of the compensation hierarchy will be retained within Defra's final guidance due to be published at the end of 2022 (see **Annex 1D Record of HRA Derogation Consultation** [APP-068]).

134. The Applicant has proposed the creation of an inland pool with islands adjacent to Loch Ryan (or the deployment of a pontoon in Loch Ryan) as compensation for predicted impacts on Sandwich tern from SEP and DEP. This follows the conclusion (in the Applicant's **RIAA** ([APP-059])) that an AEoI cannot be ruled out as a result of predicted Sandwich tern mortality due to combined collisions and displacement, when considered in-combination with other OWF. As such, the Applicant has provided compensation for Sandwich tern as part of its consent application, which is described in **Appendix 2 Sandwich Tern Compensation Document** [APP-069]. The measure at Loch Ryan would also be beneficial and effective in enhancing the conservation of a variety of wintering and migrant shorebirds and waterfowl. It would also provide safe nesting sites for a variety of species that are unable to breed successfully in Loch Ryan because there are no islands within that sea loch and the shoreline is much disturbed by human activities on the parts of the coast where there is potential nesting habitat of sand and shingle. Given the absence of other suitable measures that have not already been considered or put forward by the Applicant (as set out in **Section 7.1** and **Section 7.2**), such a measure is also in line with the Defra (2021b) draft guidance.

135. Species highly likely to colonize an inland pool or pontoon to breed include ringed plover, oystercatcher, and common tern (the latter being the subject of a funded RSPB proposal to install rafts in Loch Ryan which, if successful, may increase the chance of that species also colonising the inland pool or pontoon proposed by the Applicant). Little tern may also colonise the site although that species has not nested in that area for some years so may be less likely to return or may take longer to discover the site.

136. Migrant and wintering shorebirds, seabirds and waterfowl that visit Loch Ryan include Brent goose, shelduck, wigeon, mallard, tufted duck, scaup, eider, long-tailed duck, common scoter, velvet scoter, goldeneye, red-breasted merganser, cormorant, shag, great crested grebe, red-necked grebe, Slavonian grebe, black-necked grebe, oystercatcher, ringed plover, golden plover, grey plover, lapwing, knot, sanderling, curlew sandpiper, dunlin, ruff, black-tailed godwit, bar-tailed godwit, whimbrel, curlew, common sandpiper, spotted redshank, greenshank, redshank, turnstone, black-headed gull, Mediterranean gull, common gull, Sandwich tern, common tern, Arctic tern, little tern, guillemot, razorbill, black guillemot (Dumfries and Galloway WeBS counts, Dumfries and Galloway Bird Reports, and “Birds in Dumfries and Galloway”). Many of these species would benefit from having a secure roosting area where they could rest without risk of regular human disturbance. Providing a safe roost site will allow these birds to reduce their energy expenditure and will therefore be likely to result in an increase in numbers locally and in increased survival, potentially also causing an increase in numbers at a larger spatial scale through enhanced survival. Although Loch Ryan is not part of the UK national site network for any of these species, many of these birds are likely to move to sites that are part of the network and so this enhanced roost site at Loch Ryan will contribute to improving the conservation status of the broader network and these bird populations.

8.1.2 Delivery Mechanism

137. Full details of how the proposed measure will be delivered are set out in **Section 6.3.2** of **Appendix 2 Sandwich Tern Compensation Document** [APP-069]. In summary, the measures at Loch Ryan will be delivered either by creating an inland pool (‘lochan’) with islands a short distance from the original island at Scar Point or by anchoring a floating structure (a pontoon) off the coast a short distance from where the original island used to be located.

138. Both of these options would provide nesting habitat for a variety of birds and roosting habitat for birds during the winter and migration periods. This would provide nesting habitat for species such as ringed plover, oystercatcher, common tern, Arctic tern and little tern, and roosting habitat for a wide range of nonbreeding waterfowl, shorebirds and seabirds.

8.1.3 Scale

139. It is impossible to compare impacts on gannets measured in gannets per year with benefits to conservation of wintering, migrant and breeding waders, waterfowl and terns as these are not common currency and are qualitatively different. However,

the proposed inland pool with islands or the pontoon would greatly enhance the carrying capacity of Loch Ryan for populations of a wide range of bird species that at present have little or no safe roosting habitat in this area and no safe nesting area along that coast.

140. Wintering and migrant shorebirds and waterfowl will use the pool/pontoon at different times of the year to Sandwich tern (and in the case of the pool different areas to those used by Sandwich tern for nesting). As such the existing scale as proposed for Sandwich tern is considered to be sufficient to provide compensation both for Sandwich tern and as a non like-for-like option for gannet if required.

141. The outline design details for the inland pool or pontoon are provided in **Section 8.1.5**.

8.1.4 Location

142. An inland pool would ideally be excavated in the agricultural land immediately north of Scar Point close to the shore of Loch Ryan and close to the former nesting site. This is an area of agricultural land used for rough grazing and, as a rural area, has a low level of human activity and therefore a low risk of disturbance. It may also be possible to locate the inland pool elsewhere along the west shore of Loch Ryan. An area of search for this purpose is shown on **Figure 8-1**, although this area may be expanded as necessary to enable the selection of an optimum location from an ecological perspective whilst accounting for any constraints such as those related to land ownership, existing land use and other activities, and nature conservation designations.

143. A floating pontoon would be located in Loch Ryan close to the west shore of the loch off Scar Point. A potential location for the structure is shown on **Figure 8-1**, although the exact position will be determined at the detailed design stage, accounting for water depth and suitability for a permanent sea bed anchorage, and any other relevant considerations at the time. The potential location is slightly further off the current tip of Scar Point than the original island used to be, with this greater distance thought to be preferable to reduce human disturbance to birds on the structure and to ensure that it would be floating at all stages of the tidal cycle. This location is away from the local native oyster fishery on the east side of the loch and is also distant from ferry routes (see **Section 8.1.9** for further details).

Sheringham Shoal and Dudgeon Extension Projects

Title:

Figure 3 Potential Location of Pontoon and Initial Area of Search for an Inland Pool at Loch Ryan

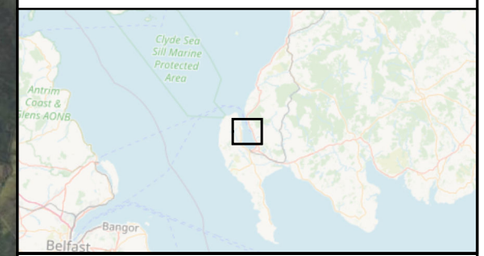
Document:

Habitats Regulation Derogation: Provision of Evidence

Application Doc. no.: 5.5

Legend:

- Potential Moored Pontoon Location
- Inland pool wider area of search
- Inland pool location preffered area of search
- Ferry Route
- RSPB common tern pontoon site area



Coordinate Reference System: British National Grid
Transformation WGS84: OSGB_1936_To_WGS_1984_7

0 324 648 972 1,296 1,620 Metres

0 390 780 1,170 1,560 Yards

Scale: 1:30,000 Scale at size: A3

Equinor Doc. no.: C282-RH-Z-GA-00013
RHDHV Doc. no.: PB8164-RHD-ZZ-ON-DR-Z-0176

REV	DATE	STATUS	DRW	CHK	APR
C	14/02/2023	Third Issue	ND	LA	AP
B	22/11/2022	Second Issue	GC	LA	AP
A	14/06/2022	First Issue	FC	LA	AP

Royal HaskoningDHV
Enhancing Society Together

equinor

8.1.5 Outline Design Details

144. Outline design details of the proposed measure are set out in **Section 6.3.5** of **Appendix 2 Sandwich Tern Compensation Document** [APP-069]. In the case of the inland pool, the design will be based on the example of St John's Pool, Caithness and would therefore include the following:

- A pool of at least 80m diameter containing two or three islands of at least 15m diameter, encompassing a total area (water and islands) of at least 1 hectare (10,000m^2) and preferably larger if the site allows. The pool would also be surrounded by a buffer of land that would ensure minimal human disturbance to birds at the pool. The size of the pool would be designed in order to accommodate any potential need in the future to increase the area of islands within it, as part of the adaptive management approach described in **Section 8.1.7**.
- The pool and the islands within it would have irregular edges with mounds of gravel or sand, to give birds a choice of substrates and positions in relation to the water. Water depths between the islands within the pool would be up to approximately 1.5m.
- Predator-proof electric fencing would be installed around the entire perimeter (which would be in the order of 600m in length).
- Appropriate measures will be designed to feed the pool with water and, if considered necessary, to provide aeration. It may be possible to construct a freshwater pool, using water from the Corsewall Burn for example to maintain the level in the pool. However, another option may be to construct a pool with the water level maintained by tidal valves with a pipe connection to the sea in Loch Ryan. A decision on this element of the design will be made during the detailed design stage.

145. In addition, if the inland pool was to be providing benefits for wintering and migrant shorebirds and waterfowl the design would be adjusted to ensure that in the migration and wintering periods there would be exposed mud around the pool edges and scrapes of bare mud in the buffer area surrounding the pool to provide foraging and resting habitat for shorebirds. These features would be created as close as possible to any viewing hide to provide the best possible opportunities for local and visiting birdwatchers.

146. A floating pontoon structure would be at least 30m by 20m in order to provide sufficient nesting habitat and stability, moored to a sea bed anchorage. The sides of the pontoon would be designed to prevent mammals from climbing out of the water onto the pontoon, to make the site safe from predators. The sides would be designed to minimise spray from wave action, for example sheet metal angled to overhang the water. The surface would be covered with a layer of gravel to provide the nesting surface preferred by terns and ringed plovers. Provision of nest box

terraces, as on the Isle of May, would help to ensure protection of nesting species against predation by gulls or crows and would provide shelter against exposure to direct sunshine and rain. The surface will be designed to provide free drainage of rainwater off the pontoon to ensure that nests cannot be waterlogged during heavy rain. A ring of floats will be installed around the pontoon to discourage people from attempting to land on the pontoon and to reduce wave action reaching the sides of the pontoon. Interpretation boards will be put on the shore walk at Scar Point to provide information about the purpose of the structure and the importance of avoiding disturbance to nesting or roosting birds. Signs will be placed on each side of the pontoon to request that people keep off the pontoon and avoid disturbance to birds.

147. In the case of both the inland pool and the pontoon, appropriate facilities to maximise the value and benefits to the local community and visitors to the area will be considered. For example interpretation boards to provide information and minimise disturbance, and bird hides.

8.1.6 Timescales

8.1.6.1 Timescale to Achieve Compensation

148. The timescales for the implementation of this measure are set out in **Section 6.3.6** of **Appendix 2 Sandwich Tern Compensation Document** [APP-069] with updates on progress provided in the **HRA Derogation and Compensatory Measures Update (Revision B)** [document reference 13.7]. Given that there is some uncertainty as to how quickly terns might start to nest, the pool or pontoon will be installed as soon as possible after the proposed compensation has been agreed and prior to the operation of any turbine. This would also be of benefit in terms of enhancing the conservation of wintering and migrant shorebirds and waterfowl at the same location.

149. Evidence from St John's Pool is that waterfowl arrived within days of the habitat being created and other similar habitat creation schemes have experienced rapid take up by waterfowl and shorebirds. Therefore, it is reasonable to expect some benefits at Loch Ryan immediately following installation, allowing for the time of year that this is completed.

8.1.6.2 Other timing considerations

150. The works, whether the installation of an inland pool or pontoon would be undertaken at a time of year (e.g. June-July) to minimise any temporary disturbance to local shorebird and waterfowl populations. Undertaking the works outside the winter months will also help to minimise any issues with adverse weather and ground conditions.

8.1.7 Monitoring, Maintenance and Adaptive Management

151. Numbers of birds nesting on the inland pool islands or pontoon would be monitored each May-June. It would be preferable to do this using a drone to photograph the

birds present, following best practice as recommended by Spaans *et al*., (2018) and by Valle and Scarton (2021). This should also allow monitoring of breeding success achieved by the birds.

152. Numbers of birds roosting should be counted at high tide on a monthly basis throughout the year but as a minimum in the non-breeding season September to April. Counts of roosting birds do not need to be highly accurate but need to be broadly indicative of species composition and numbers of birds present (i.e. of a similar standard to the established WeBS counts of birds at high tide roosts), so can be carried out from the shore by binoculars or telescope and would not require use of a drone.

153. There would be an opportunity to adapt the compensatory measure if monitoring suggested that this was necessary. Numbers of nest boxes could be increased, as could the size of the pontoon or islands (by addition of further modular sections of pontoon or increased area of islands).

154. The Applicant will engage with all relevant parties in the finalisation of the Gannet, Guillemot and Razorbill CIMP to agree the details of the monitoring programme. Monitoring results will be shared with the Gannet, Guillemot and Razorbill Compensation Steering Group (GGRCSG) (see details in **Section 8.1.8**) on an annual basis and any requirement for adaptive management measures will be agreed with the group.

155. In terms of ongoing management requirements, the inland pool or pontoon would be maintained for the operational lifetime of the authorised development if they are colonised, and routine and adaptive management measures and monitoring will continue whilst the measures are in place. In the case of the inland pool, ongoing maintenance activities would include maintenance of the predator proof fence, upkeep of any installed bird hides, removal of vegetation and any measures necessary to maintain water levels and water quality. The gravel nesting surface on the pontoon would be replaced or replenished as necessary and nest box terraces maintained on an annual basis.

156. The Applicant also recognises that this project will provide valuable learning about habitat creation for wetland birds and therefore the lessons learned, especially in relation to any requirements for adaptive management, will be made available through publication of the experiences gained.

8.1.8 Outline Implementation and Delivery Roadmap

157. Details of how the measure will be implemented and delivered are set out in **Section 6.3.8** of **Appendix 2 Sandwich Tern Compensation Document** [APP-069]. This process will be guided through consultation with the Sandwich Tern Compensation Steering Group (STCSG) which, in the event that compensation is also required for gannet, will be widened to include any additional stakeholders as part of the GGRCSG.

158. The detailed delivery proposals for the agreed compensatory measures with respect to gannet will be set out in the Gannet, Guillemot and Razorbill CIMP, which will be produced post-consent, based on the outline version provided with the DCO

application (**Annex 4A Gannet, Guillemot and Razorbill Outline Compensation, Implementation and Monitoring Plan** [APP-075]) and which must be submitted to the SoS for approval in accordance with the draft DCO wording provided in the **Proposed Without Prejudice DCO Drafting (Revision B)** [REP2-011].

8.1.9 Consideration of Potential Impacts from Implementation of the Compensation Measure

159. Details of any potential impacts that might arise as a result of the implementation of the measure at Loch Ryan are set out in **Section 6.3.9** of **Appendix 2 Sandwich Tern Compensation Document** [APP-069]. This measure would be broadly beneficial for a wide range of birds that currently have very limited opportunities to roost in locations safe from human disturbance and mammal predators and is unlikely to have any significant adverse effects on any aspect of the environment.

8.2 Reduce Bycatch in Fisheries – Research Proposal

8.2.1 Overview

160. A research proposal to better establish the scale and pattern of bycatch of gannets in Portuguese long-line fisheries alongside consideration of potential bycatch reduction measures is proposed as a project-led measure for SEP and DEP. Whilst the Applicant recognises that this measure on its own may not represent 'compensation' in accordance with draft Defra guidance (Defra, 2021b), it is a like-for-like measure which would make a valuable contribution to understanding gannet bycatch within the main wintering area for the UK population and could unlock future conservation/compensation that would likely benefit FFC SPA gannet directly.

161. Bradbury *et al*. (2017) produced a GIS tool which showed the relative risk for UK seabirds of bycatch in fisheries in UK waters. They identified gannet as being at risk of bycatch in fisheries in UK waters, with the risk higher in summer than in other seasons and higher in inshore waters of Scotland than in other geographic locations.

162. Miles *et al*. (2020) reported a preliminary assessment of seabird population response to potential bycatch mitigation in the UK-registered fishing fleet. It was concluded that bycatch mortality of gannets in this fishery represented slightly more than 1% of the annual natural mortality. Using data from Northridge *et al*. (2020), Miles *et al*. (2020) estimated that the annual bycatch of gannets by UK-registered fishing vessels was between 25 and 764 birds per year. Bycatch of gannets in UK waters seems to be relatively small compared to bycatch of UK gannets occurring outside the breeding season in wintering areas.

163. Gannet was found to be the seabird species most frequently caught as bycatch by Portuguese mainland coastal fisheries, particularly on demersal long-lines and in set nets, but also taken in purse-seine catches (Oliveira *et al*. 2015). These fisheries overlap with the main wintering area of UK gannets, so will be catching some birds from UK SPA populations. The limited data from Oliveira *et al*. (2015) suggest that the bycatch from fisheries in southern Europe may kill more gannets each year than the total predicted precautionary estimates of collision mortality at all OWFs in the UK. However, sampling intensity of bycatch in the fisheries was low, and there was

uncertainty about the bycatch taken when observers monitoring this were not on-board vessels. That uncertainty led the authors to suggest that the bycatch may be even larger than reported.

164. Calado *et al*. (2020) reported that gannet was frequent in the bycatch taken by fisheries in Iberian coastal waters of the Atlantic, especially in long-lines. Gannet bycatch occurred throughout the year, with bycatch in summer mainly being immature gannets. Immature birds remain in southern European waters while adults have returned to breeding colonies, so it is not surprising that immature birds occurred in larger proportions at that time of year. These authors concluded that the scale of the bycatch could have significant impacts on the whole gannet population. Reducing that bycatch would therefore provide considerable scope for delivering compensation strategically.

165. A large bycatch of gannets in West African waters was reported by Grémillet *et al*. (2020), but the scale of this problem was unclear. Reducing that bycatch would also therefore provide considerable scope for delivering compensation strategically. However, the unregulated nature and lack of monitoring of this impact may make it difficult to address.

166. Clark *et al*. (2020) investigated behavioural responses of breeding adult gannets in Iceland to fishing vessels using GPS tracking. Fishery discarding is illegal in Iceland and gannets in Iceland did not switch from travelling to foraging when they came close to fishing vessels. Foraging trips by gannets were relatively short, suggesting high availability of preferred food (presumed to be pelagic fish). It was concluded that the lack of an association between gannets and fishing boats in Iceland was due to a combination of high availability of pelagic forage fish and a lack of discarding by Icelandic fishing boats providing an alternative food source. This implied less risk of bycatch from fisheries in Iceland, so shows two potential management approaches to reduce bycatch (reduce fishing effort on pelagic forage fish, and cease all discarding of waste fish from fishing boats).

167. Highest risk of bycatch of gannets appears to be in long-line fisheries. Well-established methods that can reduce seabird bycatch on long-lines have been available for several decades (Melvin and Parrish 2001), but these mainly focus on bycatch of albatrosses and petrels (Lokkeborg 2011, Avery *et al*. 2017). None of the methods have been tested on northern gannet. However, bird-scaring lines, night setting and line-weighting, have been successfully applied to reduce the bycatch of seabirds in South Africa, including the closely-related Cape gannet *Morus capensis* (Rollinson *et al*. 2016).

168. Use of scaring lines and line weights to increase the sink rate of demersal long-lines were shown to be successful in reducing bycatch of seabirds in Namibia, and reduced bycatch of Cape gannets by 100% in that study (Paterson *et al*. 2019).

169. The use of scaring lines and water sprayers have been shown to reduce bycatch in trawl nets in Australia, which included bycatch of Australian gannets *Morus serrator* (Koopman *et al*. 2018), so indicates that deployment of scaring lines and water sprayers would be a possible approach to reduce bycatch in long-line fisheries.

170. These studies indicate that bycatch of gannets could be reduced by implementation of bird scaring lines, water sprayers, increased line weight, and nocturnal setting in long-line fisheries where gannet bycatch is occurring.

171. Nocturnal setting of long-lines might be especially effective in reducing bycatch of northern gannets in Europe or west Africa because gannets forage much less at twilight than during the day, and do not feed at night, either when breeding or in winter (Hamer *et al*. 2007, Langston *et al*. 2013, Garthe *et al*. 2014, Warwick-Evans *et al*. 2015, 2017, Furness *et al*. 2018).

172. If compensation is required and if reduction in fishery bycatch of gannets is considered an appropriate route to achieve this, the best approach may be to implement a management regulation through the EU Common Fisheries Policy that longline fisheries in EU waters should limit setting of demersal long-lines to night-time in order to reduce bycatch of gannets.

173. Because most bycatch of adult gannets on longlines in southern Europe occurs during October to March, and most bycatch of gannets in summer months is of immature birds, it may be appropriate to establish a requirement for night-time setting only during the gannet nonbreeding season (October to March). However, there would be scope to reduce bycatch further by requiring night-time setting throughout the year. However, this would require EU action and/or a strategic international response.

8.2.2 Delivery Mechanism

174. Since the scale of the bycatch problem in southern Europe is uncertain and since a strategic response would be required to implement bycatch reduction measures, the Applicant considers it more appropriate to carry out research to better establish the scale and pattern of the problem, and to investigate the merits of different bycatch reduction measures. This should especially include investigation of whether bycatch of other seabird species might by affected by measures aimed at reducing bycatch of gannets. Additional research would further the evidence base and support future implementation of bycatch reduction measures in this geography, where the greatest benefit to the UK national site network could potentially be achieved.

175. Bycatch studies would best be undertaken by local ornithologists in the relevant country. It is proposed that a study is devised and funded in part by the Applicant (and possibly by other OWF developers also required to compensate for impacts on gannets) to obtain observer coverage over a two-year period on a sample of at least 5% of long-line vessel trips from one to four selected fishing ports in Portugal, so that the bycatch can be scaled up for the entire local fishery in a reliable way.

176. The study would be carried out by Portuguese ornithologists. Observer monitoring uses standard internationally agreed methods to quantify seabird bycatch (see **Section 8.2.6**). Once quantified as a baseline, observers could then test the efficacy of standard bycatch reduction measures (such as, but not necessarily limited to, nocturnal setting, hook-pod deployments, increased line weighting, plastic streamer lines, kites, underwater setting tubes, hook shape and size, bait type and colour). This testing would be carried out over one year and in the non-breeding season

only. Such work would provide a much stronger basis for selection of the most suitable bycatch reduction methods to reduce bycatch of gannets while also reducing bycatch of other seabird species (bearing in mind that some other seabirds in the bycatch may be in much less favourable conservation status than gannet). The study outcomes would be made available in a peer-reviewed publication in an open-access journal (or as a minimum through a report made available online).

8.2.3 Scale

177. The research proposal and testing of the efficacy of standard bycatch reduction measures may not be considered to deliver compensation on their own, but are put forward as what is considered to be a valuable piece of work that could unlock future strategic opportunities for delivery of bycatch reduction measures overseas, as compensation for predicted OWF impacts.

178. The scale of the compensation that could ultimately be delivered on a strategic basis is uncertain, because the scale of the bycatch of gannets in southern European fisheries remains rather uncertain. However, accounting for the information that is available, as outlined above, the applicant considers that it is highly likely that bycatch is very much larger, probably at least two or three orders of magnitude larger, than assessed impacts of offshore wind on gannets. The annual total of gannets from FFC SPA at risk of mortality due to the combined effects of collision and displacement at SEP and DEP is 4.35 birds (95% CI 1.19 - 10.23) (**Section 6**). If so, the scope for strategic compensation through bycatch reduction is likely to be very considerable despite being difficult to quantify.

8.2.4 Location

179. As set out in **Section 8.2.2**, the bycatch reduction research proposed by the Applicant would be delivered in conjunction with Portuguese ornithologists to obtain observer coverage throughout the year on long-line vessel trips from selected fishing ports in mainland Portugal. **Plate 8-1**: (from Bueno-Pardo *et al*., 2020) shows the key fishing ports and regions in continental Portugal. Consideration of which fishing ports should be targeted, and to what extent, would form part of the research proposal and would be discussed with Portuguese ornithologists and fishermen as appropriate. Oliveira *et al*. (2015) assessed bycatch by fishing boats from 15 ports along the Portuguese mainland coast. However, Calado *et al*. (2020) sampled bycatch on long-line fishing trips from Peniche in central-west Portugal and this may be the most appropriate port for such work. Subsequent testing of the efficacy of standard bycatch reduction measures would also be undertaken from fishing ports in Portugal.

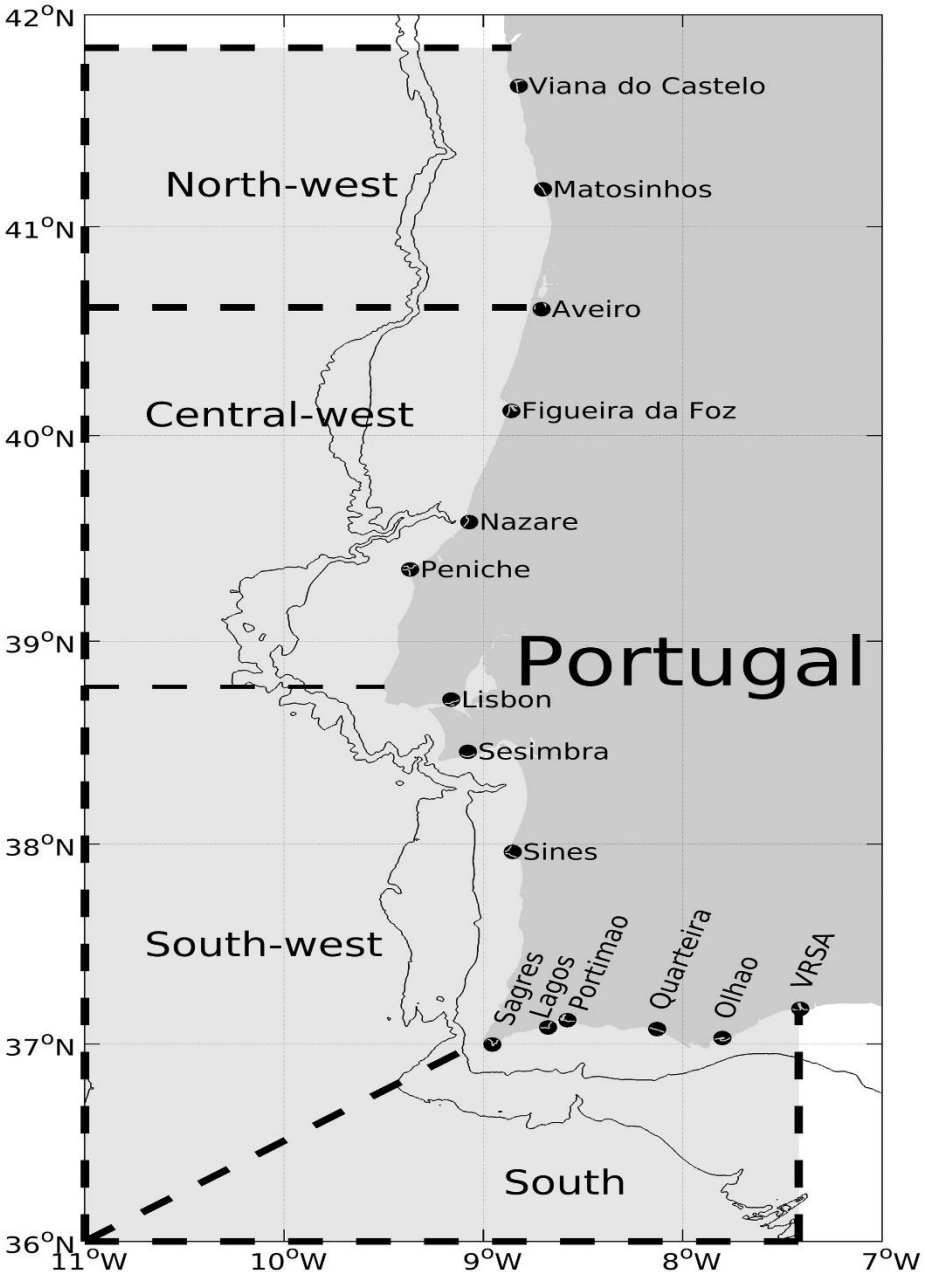


Plate 8-1: Map of Continental Portugal with the Regions and Key Ports. The Bathymetry shown Corresponds to 200m and 1000m. Source: Bueno-Pardo et al., 2020

8.2.5 Timescales

180. The bycatch research proposal will be commenced prior to operation of SEP and DEP. As described in **Section 8.2.1**, most bycatch of adult gannets on longlines in southern Europe occurs during the non-breeding season (October to March). However, there would be benefit in carrying out the observer monitoring across the year to capture bycatch data in the summer months. This will help to inform the subsequent recommendations on the selection of the most suitable bycatch reduction methods e.g. whether night-time setting should be required throughout the

year or only during the nonbreeding season. Two years of baseline data collection are proposed across two full non-breeding seasons to capture any interannual variation in bycatch rates.

181. Testing of the efficacy of standard bycatch reduction measures will be undertaken across one year and in the non-breeding season only, when bycatch rates are expected to be highest.

8.2.6 Monitoring

182. Placing a video camera that is controlled by the equipment that deploys and hauls long-lines to record all fish and bycatch brought onboard allows detailed monitoring of bycatch. Systems need to be in place that require skippers to notify the regulator of each fishing trip so that a hard drive can be positioned on the vessel at the start of the trip and collected at the end. It may be appropriate to examine a random subsample of the video to check that results match the skipper's logbook record. If there is a discrepancy the whole video can be analysed at the skipper's expense (which ensures accurate logbook record keeping and reduces the need to analyse entire video recordings). Systems of this kind have been in place for several decades in some fisheries (e.g. Canadian sablefish fishery) so best practice guidance on such approaches is available from such established management and will be followed, where relevant, for this proposal.

183. In the case of the research proposal, observer coverage would be obtained throughout the year (over a two-year period on a sample of at least 5% of long-line vessel trips from fishing ports in Portugal), with the monitoring to quantify seabird bycatch undertaken to standard internationally agreed methods including Gilman *et al*. (2022) and Gilman *et al*. (2008). The efficacy of bycatch reduction measures would be tested using the same observer program with the aim of providing a much stronger basis for selection of the most suitable bycatch reduction methods to reduce bycatch of gannets and other seabird species.

8.2.7 Outline Implementation and Delivery Roadmap

184. If compensation is required, the steps that would be followed by the Applicant to implement and deliver the bycatch reduction research proposal are as follows:

- Following the consent being granted, a steering group (GGRCSG) comprising all relevant stakeholders will be established to oversee the development, implementation, monitoring and reporting of the compensation. Core members of the GGRCSG will include the MMO, Natural England and a selected local delivery partner in Portugal (likely the Portuguese Society for the Study of Birds (SPEA) who are a BirdLife partner in Portugal). The RSPB will also be invited to participate.

- As set out in **Section 8.2.5**, it is proposed to commence the bycatch reduction research proposal prior to operation of SEP and DEP i.e. prior to first operation of any wind turbine forming part of the authorised development, with the assumption at the time of writing being first power in late 2028 (**Table 9-3**). The exact timescale will be agreed with relevant stakeholders.
- The scope of the research proposal will be established with the local delivery partner and informed through consultation with the GGRCSG and relevant local stakeholders representing the Portuguese fishing industry and conservation groups.
- The detailed delivery proposals for the agreed compensatory measures will be set out in the Gannet, Guillemot and Razorbill CIMP, which will be produced post-consent, based on the outline version provided with the DCO application (**Annex 4A Gannet, Guillemot and Razorbill Outline Compensation, Implementation and Monitoring Plan** [APP-075]) and which must be submitted to the SoS for approval in accordance with the draft DCO condition wording provided in the **Proposed Without Prejudice DCO Drafting (Revision B)** [REP2-011].
- The outcomes of the research proposal will be monitored and reported in line with the details described in **Section 8.2.6**, with the results provided to the GGRCSG each year to allow for discussion and feedback and to inform any requirement to adapt the work being undertaken.
- Any amendments to or variations of the approved Gannet, Guillemot and Razorbill CIMP must be in accordance with the principles set out in this Gannet, Guillemot and Razorbill Compensation Document and may only be approved where it has been demonstrated to the satisfaction of the SoS that they are unlikely to give rise to any materially new or materially different environmental effects and that the required level of compensation will continue to be delivered.

8.2.8 Consideration of Potential Impacts from Implementation of the Compensatory Measure

185. Bycatch on longlines in southern Europe affects not only gannets but also several other seabird species that may originate from protected areas, including gulls and shearwaters of high conservation concern. Should this research proposal lead to the implementation of bycatch prevention technologies as standard practice within longline fisheries in southern Europe, such measures would be likely to reduce bycatch of other seabirds too, so would be broadly beneficial.

186. However, particular attention would need to be paid to whether such measures might risk an increase in bycatch of a seabird with particular ecology. Restricting setting longlines to night would be expected to be highly effective in reducing bycatch of gannets because gannets only feed during daylight, but it could potentially risk an increase in bycatch of nocturnal seabirds. Given the poor

conservation status of some of the seabirds that may be included in long-line bycatch in southern Europe, this is an important issue which will be considered in the Gannet, Guillemot and Razorbill CIMP and in the course of the testing and reporting of the bycatch reduction measure.

9 Measures Taken Forward – Guillemot and Razorbill

9.1 Prey enhancement through sandeel stock recovery and ecosystem-based management

9.1.1 Overview

187. The importance of abundant forage fish in the vicinity of common guillemot and razorbill colonies has been established in various parts of the world (Furness and Tasker 2000, Pennington *et al.*, 2004, Cury *et al.*, 2011, Miles and Parnaby 2021, Kadin *et al.*, 2016, Montevecchi *et al.*, 2019, Hentati-Sundberg *et al.*, 2020). Breeding common guillemots and razorbills at colonies in the North Sea usually feed by preference on sandeels and sprats (or juvenile herring) where these fish are available as they seek to provide lipid-rich food for growing chicks. However, guillemots and razorbills seem to have more buffering against prey shortage and in the case of guillemots (Smout *et al.*, 2013), seem to be better able to switch from sandeels to sprats than are some other seabird species such as kittiwake or puffin (Wanless *et al.*, 2018). Although guillemot and razorbill breeding success and chick fledging weights fell at Shetland when sandeels became scarce, their breeding success was reduced much less than that of terns, kittiwakes or puffins (Furness and Tasker 2000, Pennington *et al.*, 2004).

188. For guillemots, limits to buffering and a cost of such responses to reduced food abundance or quality can be seen at the physiological level. Storey *et al.* (2017) showed that guillemot body mass and chick-feeding rates were higher in good years than in poor years and heavier guillemots were more likely to fledge a chick than lighter birds. Stress hormone levels (corticosterone) were highest in adult guillemots in intermediate years (moderate forage fish availability) when foraging effort increased to rear surviving chicks but were lower in bad years (low forage fish availability) when extra foraging effort would have been unable to compensate for low prey abundance.

189. Using synoptic marine bird and hydroacoustic surveys during winter, Schaefer *et al.* (2020) showed that wintering common guillemots tended to distribute themselves above aggregations of forage fish. The authors concluded that their data show the importance of forage fish aggregations as the main driver of guillemot spatial aggregations in winter. Winter diets of auks are difficult to study, but there is some evidence from analysis of stomach contents that guillemots continue to feed on sandeels in winter (presumably by digging them out of the sand as sandeels tend to be buried in the sand and living off stored lipids from autumn to spring).

190. There is evidence that guillemot and razorbill mortality peaks during winter, and therefore that winter may represent a bottleneck of high energy demand and low availability of food, as well as a time of exposure to extreme weather (Wernham *et*

al., 2002, Louzao *et al.*, 2019). There may be carry-over effects of breeding season reproductive effort by adults on their overwinter survival prospects (for example mediated by impacts of breeding on body condition).

191. Although the influence of sandeel stock biomass on guillemot and razorbill breeding success is relatively weak (Furness and Tasker 2000), analysis of Isle of May guillemot and razorbill return rates provides some empirical evidence for there being an effect of sandeel abundance on survival. The available data suggest that the influence of sandeel abundance on adult guillemot and razorbill survival is strongest at the lowest sandeel stock size, but that there is little change in adult survival between moderate and high sandeel abundances i.e. the relationship is non-linear, as predicted by theory.

192. There are no data available on how survival rates of immature age classes of guillemots and razorbills are influenced by sandeel abundance, but it is likely that this relationship will be more pronounced in immature individuals than in adults. Adults have the advantages of experience and social dominance that are likely to give them greater access to highest quality foraging habitat and prey, and so decreases in forage fish abundance will probably affect inexperienced younger birds more than adults.

193. Fishing on sandeels is one of the main factors that reduces the abundance of sandeels in the North Sea (Lindegren *et al.*, 2018 and reviewed in MacArthur Green, 2022). Ecopath-Ecosim ecosystem modelling (Bayes and Kharadi 2022) concluded that a closure of the sandeel fishery in the North Sea would lead to a 40% increase in the biomass of the sandeel stock and a 42% increase in the number of seabirds within the first 10-15 years after closure of the sandeel fishery (Bayes and Kharadi 2022). That modelling did not separate out effects on auk numbers from effects on all seabird species in general, but since auks are more dependent on sandeels for food than are many other seabird species (Furness and Tasker 2000), it is reasonable to expect that the increase in auk numbers would be greater than that of some other seabird species. The Consultation Outcome summary of responses published by Defra (2022) stated that the introduction of new restrictions in the sandeel fishery "*could lead to positive ecological impacts by allowing these stocks to recover and support the health of the rest of the marine ecosystem*" with "*the bounce back of heathy fish, seabird and marine mammal populations*", further supporting the conclusion that this could be an effective strategic compensation mechanism.

194. Lindegren *et al.* (2018) carried out a hindcast analysis of the Dogger Bank sandeel stock to assess the consequence of the high fishing mortality. They estimated that sandeel spawning stock biomass would have been about twice as large now as it is, if the fishery had maintained fishing mortality (F) at F=0.4 rather than at the levels of F=0.8 to 1.2 as seen during 1999-2009 in the history of this fishery. Indeed, the stock would be even larger now if there had been no fishery harvesting sandeels, although Lindegren *et al.* (2018) did not report on that scenario. Lindegren *et al.* (2018) also identified influences of sea temperature and copepod abundance on the abundance of sandeels and suggested that long term trends in those drivers may inhibit recovery of sandeels if fishing pressure was reduced. In addition, severe

reduction in forage fish stock biomass can lead to increased natural mortality that may inhibit recovery, and there is evidence of this with sandeel declines to low biomass (Saraux *et al.*, 2020).

195. At present, the Dogger Bank sandeel stock remains considerably below its long-term average abundance and is subject to a fishing mortality around F=0.6 (ICES 2020, 2021), a figure above the level tested in the scenario of Lindegren *et al.* (2018), and a figure which their scenario modelling clearly demonstrates has a negative impact on sandeel abundance. Indeed, at present the spawning stock biomass in this area is less than 10% of its highest historical level and is slightly below the limiting spawning stock biomass at which ICES should recommend closure of the fishery (B_{lim} of 110,000 tonnes SSB) because there is an increased risk of recruitment failure in this stock (ICES 2020, 2021).

196. Although the relationship between guillemot and razorbill survival and sandeel stock biomass is uncertain, and has only been quantified for the Isle of May (MacArthur Green, 2022) and not for birds at FFC SPA, measures that result in an increase in abundance of sandeels in ICES SA1r from its current very low level can be considered to be targeted and moderately likely to be effective in resulting in an increase in guillemot and razorbill survival.

9.1.2 Delivery Mechanism

197. The most effective way to allow sandeel stocks to recover is to change sandeel management. Normal management is for ICES to advise on appropriate quotas for sandeel harvest based on the objective of not depleting spawning stock biomass below B_{lim} which is the spawning stock biomass below which future recruitment of sandeels becomes increasingly at risk. One delivery mechanism could be a change in ICES advice to shift to ecosystem-based management rather than an objective to maximise sustainable yield of sandeel. Adopting ecosystem-based management that recognises threshold abundances of forage fish needed to sustain dependent predators has been advocated for forage fish fisheries globally, including North Sea sandeels (e.g. Hill *et al.,* 2020). Nevertheless, such a change can be considered as compensation in that it represents change 'over and above' normal management practiced throughout the history of this fishery and remaining in place at the present time.

198. ICES promotes 'ecosystem-based management' of fish stocks. However, their management of the sandeel stock has recently been criticised as not being 'ecosystem-based' because it sets a quota only on the basis of sustaining the sandeel stock and not on the basis of the needs of higher trophic level predators including seabirds (Hill *et al*., 2020). ICES should therefore be highly receptive to the need to better manage that sandeel stock to avoid adverse impacts on seabirds and other top predators.

199. An alternative delivery mechanism could be a strategic decision by Defra to legislate to reduce fishing pressure on sandeels in UK waters as strategic compensation for offshore wind. An extension to a proposed fisheries management area or a new proposal to provide protection through closure to fishing for sandeels would need to be facilitated by the UK Government in allocating appropriate powers to a relevant

management body and, potentially, through the delivery of legislation to secure the necessary powers.

200. Of these two different delivery mechanisms, the Applicant considers that the more suitable as compensation would be a strategic decision by Defra to legislate to reduce fishing pressure on sandeels in UK waters as strategic compensation for offshore wind. Creating a change in ICES policy would require international agreement that may be difficult to achieve.

201. Key stakeholders (Natural England and RSPB) engaged through the Projects' EPP, have expressed significant support for tackling the pressure on seabird prey resources as a form of compensation for offshore wind. This is not only reflected in **Annex 1D Record of HRA Derogation Consultation** [APP-068], but also within submissions from interested parties during examination and determination of the Hornsea Project Three, Norfolk Vanguard, Norfolk Boreas, East Anglia One North and Two DCOs.

202. Closing sandeel fisheries has also been proposed by Berwick Bank Offshore Wind as a compensation measure (BBC 2022). According to BBC (2022) SSE stated "*We think that it's important that we manage the sandeel fisheries carefully to allow enough prey for the seabirds and to allow for offshore wind development, which is key to addressing the climate emergency which also sits behind the decline in seabird numbers. We recognise that there might be an impact from an offshore wind farm on birds but we know that the bigger impact is caused by climate change*".

203. It has also been raised in relation to the Hornsea Project Four DCO examination with Natural England stating that "*Natural England have long held the view that a primary pressure acting on English seabirds, and especially kittiwake, is the reduction in prey availability associated with commercial fisheries targeting forage fish (notably sandeels). A number of reviews have concluded that improving prey availability is likely to be the most effective way of compensating for offshore wind impacts on seabirds. However, forage fish management is highly complex, and an ecosystem-based approach is needed to safeguard sufficient prey resources for seabirds, whilst reducing the risk of unintended consequences (e.g. pressure on other fisheries). Nevertheless, improving the amount of prey remains the single strategic measure most likely to deliver significant benefits to FFC SPA seabird populations. We highlight that prey availability measures would also have the additional benefit of addressing the effective habitat loss that could result from auk displacement, by increasing the foraging resource within those areas that remain available*." (Natural England, 2022).

204. Given the acknowledged and significant potential of such an action to provide far greater compensation than even the most precautionary estimates of losses incurred due to SEP and DEP and offshore wind in total, prey enhancement measures could form a valuable part of the compensation proposals for SEP and DEP, but as a measure that could only be delivered strategically. Nonetheless, an option for the Applicant to pay a financial contribution towards the establishment of prey enhancement as a strategic compensation measure has been included within the draft DCO wording provided in the **Proposed Without Prejudice DCO Drafting (Revision B)** [REP2-011]. Further details with respect to this are set out in **Strategic**

and Collaborative Approaches to Compensation and Measures of Equivalent Environmental Benefit [APP-084].

9.2 Fishery Bycatch Reduction

9.2.1 Overview

205. Auks in UK waters are not thought to be caught in longline fisheries but are at risk of bycatch in trawl and in set net (gillnet) fisheries. Northridge *et al*. (2020) noted bycatch of 27 guillemots and three razorbills in 2,239 midwater trawls sampled in 1996-2018 and bycatch of 267 guillemots and 12 razorbills in 18,916 hauls of gillnets sampled over the same period. Their sampling extended slightly beyond the UK territorial limit (see Figure 1 in Northridge *et al.,* 2020) but was predominantly within UK waters. The evidence therefore indicates bycatch of these species in UK waters to be most severe in set net fisheries.

206. Most bycatch of guillemots and razorbills was observed in southwest England and the English Channel (Figure 3 in Northridge *et al.,* 2020) but there was also a 'hotspot' of bycatch off east England close to FFC SPA. At the DCO application stage, the Applicant had focused its proposals on the implementation of bycatch reduction measures in the northeast of England. However, since submission of the DCO application, the Applicant has had further discussions with fisheries stakeholders in the northeast of England and has ascertained that the level of set net (gillnet) fishing activity, and therefore auk bycatch, is unlikely to be of a sufficient scale to present a feasible compensation measure. The Applicant has therefore refocussed its proposals on the southwest of England where there is a much greater concentration of set-net fishing activity and therefore auk bycatch (Northridge *et al.,* 2020) (further details are provided in **Annex 4B Auk Bycatch Reduction Feasibility Statement** [document reference 5.5.4.3]).

207. Using the bycatch data in Northridge *et al*. (2020), scaled up to the entire fishery, Miles *et al*. (2020) estimated that bycatch of guillemots in UK set net fisheries in the UK European Economic Zone (EEZ) (a median estimate of 1,984 birds per year) may represent 1.7% of annual mortality of breeding adult guillemots (assuming that bycatch was equally distributed across all age classes in the population and only affected birds from the UK population rather than birds visiting UK waters from other countries). Similarly, bycatch of razorbills in UK gillnet fisheries in the UK EEZ (a median estimate of 130 birds per year) may represent 0.4% of annual mortality of breeding adult razorbills.

208. Miles *et al*. (2020) suggest that because Northridge *et al*. (2020) did not include sampling from non-UK vessels fishing in UK waters the results they presented "*are likely to underestimate the potential population increases that could be achieved by bycatch mitigation*".

209. However, it should be noted that the sampling period (1996-2018) included many years before bycatch mitigation was put into effect at Filey Bay which has considerably reduced bycatch of guillemots and razorbills in the gillnet fishery there; before mitigation the bycatch was estimated as 200 guillemots and 323 razorbills in 2008, and 186 guillemots and 277 razorbills in 2009 (Quayle, 2015). After mitigation

was introduced in 2010 the bycatch was reduced to an average of 11 guillemots and 43 razorbills per year in 2010-2014 (Quayle, 2015).

210. Set net fishing effort has reduced in recent years because of declines in salmon stocks to critically low levels. However, set nets are still being used to catch sea trout, and those nets are likely to be responsible for a major part of the bycatch of guillemots and razorbills (Environment Agency, 2020).

211. The reduction of seabird bycatch will be achieved through the use of above water deterrents (AWD) attached to fishing nets at regular intervals. There are multiple types of reduction techniques that can be used to reduce the interaction between diving seabirds and fishing equipment. Bycatch reduction techniques are designed to be suited to specific gear types and bycatch species. AWDs are usually fixed to buoys or markers attached to set fishing gear, which work to scare birds away from fishing nets. LEBs are one of the most highly developed forms of above water deterrent, which have been developed and trialled by BirdLife International in conjunction with Fishtek Marine (see **Annex 4B Bycatch Reduction Feasibility Statement** [document reference 5.5.4]). If compensation for auks is deemed to be required by the Secretary of State, the Applicant will pursue the implementation of bycatch reduction measures through the use of AWDs / LEBs.

9.2.2 Baseline Monitoring of Guillemot / Razorbill Bycatch in Southwest England

212. If an adverse effect on the integrity of the guillemot and / or razorbill features of the FFC SPA is concluded by the SoS for SEP and / or DEP in-combination, and compensation is required to be delivered at the project-level through implementation of bycatch reduction technologies, the Applicant would seek to sign up fishers to implement remote electronic monitoring (REM) systems and above water deterrents (AWD) ((i.e. technologies such as LEBs) and contribute to the evidence base regarding baseline levels of bycatch.

213. Within **Table 9-3**, the Applicant has committed to undertake one year of baseline monitoring of bycatch of guillemots and razorbills in the relevant gillnet fishery in order to be able to quantify the gain being made once measures are implemented. The Applicant notes the following Natural England comment at Point 42 of Appendix C of RR-063:

> *Only one year of baseline monitoring of bycatch is proposed, and this monitoring is not implemented until the completion of the development of compensation proposals and site selection. Natural England highlight the necessity of identifying and quantifying bycatch as part of the measure development and site selection process. It is currently uncertain that there is bycatch of the target species that can be reduced. Further, the nature of this bycatch is not understood, so any measure to address it is purely speculative.*
>
> *Natural England advise that at least two years of baseline data should be gathered to account for inter-annual variation.*

214. The above comment was made when the Applicant's proposal was focussed on implementing bycatch reduction measures in the northeast of England. Now that the Applicant has refocussed efforts on the southwest where Hornsea Project 4 (HP4)

have undertaken two years of trials (see **Annex 4B Auk Bycatch Reduction feasibility Statement** [document reference 5.5.4.3]), there is a potential opportunity for the Applicant to collaborate on or supplement the baseline monitoring work undertaken by HP4. If required, the Applicant would be willing to work with HP4, Natural England and the RSPB to ensure consistent data collection and analysis methods. The HP4 trials involved the deployment of control nets which did not have LEBs installed which should give an indication of the baseline level of bycatch which occurs, although these data are not publicly available. HP4 also used a questionnaire with fishers to gain an understanding of the existing levels of bycatch (**Section 9.2.5**). The Applicant would seek to agree the specific requirements for baseline monitoring with the GGRCSG post-consent if compensation is deemed to be required.

9.2.3 Hornsea Project Four Bycatch Mitigation Trials

9.2.3.1 Overview and Applicability to SEP and DEP

215. HP4 has undertaken an extensive body of work investigating the potential for LEBs to reduce the potential for bycatch of auks and therefore deliver on its without prejudice compensation requirements. A summary of the work undertaken by HP4 is provided in **Annex 4B Auk Bycatch Reduction Feasibility Statement** [document reference 5.5.4.3].

216. Ørsted [HP4: REP7-017], describes HP4's guillemot and razorbill bycatch mitigation trials using LEB for autumn / winter 2021 / 2022. Ten vessels were secured for participation in trials in 2021 / 2022 and at least 22 vessels (including those signed up for 2021 / 2022) were signed up for participation in trials for autumn / winter 2022 / 2023, all using REM (2 x Closed Circuit Television (CCTV) cameras per vessel). Results from the 2022 / 2023 trials are yet to be released.

217. The Applicant recognises that both Natural England and the RSPB have raised a number of concerns regarding the approach taken and the evidence provided to date by HP4 and at this stage have indicated that they do not consider bycatch reduction through implementation of LEBs to be a viable compensation measure (**Section 9.2.3.3**). However, it remains the Applicant's position that of the options available to it, the proposed measure remains the most appropriate and proportionate approach to auk compensation that can be put forward on a project-led basis and that there is sufficient evidence to suggest that bycatch reduction is a viable compensatory measure. See **Section 7** regarding the challenges around identifying suitable project-led compensatory measures for auks.

9.2.3.2 Hornsea Project Four's Auk Compensation Requirement

218. Ørsted (2022a) [HP4: REP7-017] states that seven vessels implementing AWDs and 175 available nesting spaces for HP4's predator eradication measure per annum will be required to compensate for the project's predicted 40 guillemot mortalities (assumed to be mean values based on 50% displacement, 1% mortality) which provides a 1:2 ratio of compensation. For razorbill, one vessel would be required to implement AWDs and 12 available nesting spaces for HP4's predator

eradication measures per annum will be required to compensate for the project's predicted 12 razorbill mortalities (assumed to be mean values based on 50% displacement, 1% mortality) which, again, provides a 1:2 ratio of compensation. The Applicant notes that the trials undertaken by HP4 in winter 2022 / 2023 will provide further data on which to estimate potential reductions from implementation of LEBs and may require HP4 to refine the number of vessels required to implement REM systems and AWDs in order to deliver on the project's compensation requirements.

219. It is recognised that there is disagreement between Natural England and HP4 on the displacement and mortality rates to be used to calculate mortalities, with Natural England advising that compensation measures should be judged against their ability to compensate for 1,131 guillemot and 114 razorbill adult mortalities per annum (based on 70% displacement and 5% mortality rate – with the higher mortality rate representing Natural England's position that auks at the HP4 site are more sensitive because this area is a chick rearing / moult area). Therefore, if HP4 is consented, the SoS's decision regarding the number of guillemot and / or razorbill that are required to be compensated for is likely to influence the number of vessels on which HP4 is required to implement AWDs.

9.2.3.3 Summary of Natural England and RSPB Concerns with Hornsea Project Four Bycatch Mitigation Trials

220. Natural England [RR-063] and the Royal Society for the Protection of Birds [REP1-161] have clearly set out their concerns regarding the bycatch mitigation trials undertaken by HP4 and the Applicant's reliance on the evidence provided by HP4 to inform SEP and DEP's bycatch reduction compensation proposal. A summary of concerns and the Applicant's response is provided in **Table 9-1**.

Table 9-1: Summary of Natural England and RSPB concerns regarding auk bycatch reduction mitigation proposals and the Applicant's response

ID	Summary of Natural England and RSPB Concerns Regarding Auk Bycatch Reduction Mitigation Proposals	Applicant Observation / Response
1	LEBs are currently an unproven technology	The Applicant considers the implementation of LEBs / AWDs to be the best available option for offshore wind farm developers with small numbers of auk mortalities to deliver project-led compensation (see **Annex 4B Auk Bycatch Reduction Feasibility Statement** [document reference 5.5.4.3]). Regarding the Applicant's collaborative and strategic compensation proposals, see the **Habitats Regulations Assessment Derogation and Compensatory Measures Update (Revision B)** [document reference 13.7].
2	Reliance on a single technological intervention (i.e. LEBs) increases risk	
3	At the time of the HP4 Examination, only the first year of the trial had been undertaken and therefore this is all that could be reported upon. Natural England and RSPB do not consider a single year of data collection to be sufficient to draw meaningful	The Applicant agrees that with only one year of data there are uncertainties regarding the efficacy of LEBs however notes that a second year of surveys during 2022 / 23 has been undertaken by HP4 which will increase the evidence base and provide a more robust picture. If an in-combination adverse effect on the integrity of the FFC SPA guillemot and / or razorbill features is concluded by

ID	Summary of Natural England and RSPB Concerns Regarding Auk Bycatch Reduction Mitigation Proposals	Applicant Observation / Response
	conclusions on LEB efficacy. Multi-year trials are required.	the SoS for SEP and DEP and the Applicant is required to deliver compensation, the Applicant is committed to implementation and monitoring of AWDs at least until the success of the compensation has been demonstrated, but potentially throughout the operational lifespan of SEP and DEP, which will further the evidence base regarding the efficacy of, e.g. LEBs. At this stage, the trials undertaken by HP4 represent the best available evidence for the Applicant to formulate its project-led bycatch reduction compensation proposals. The Applicant will keep abreast of the results from the second year of the HP4 trials and update its assumptions (e.g. regarding the number of vessels required to be signed up for implementation of LEBs (see **Section 8.1.3**)) in line with any changes in the evidence available.
4	Restrictions on data sharing have prevented the rates of auk bycatch from being published and verified	The Applicant understands that HP4 has attempted to address this matter by making results less restricted by confidentiality agreements than the first year (Natural England, 2023), and the Applicant would look to emulate this during its implementation and monitoring stage so that there is a suitable level of transparency regarding data collection, analysis and dissemination.
5	External audit of data and analysis to approve the findings of the trial	The Applicant would consider the requirement for external audit of data and analysis in consultation with the GGRCSG during the implementation and monitoring stage.
6	Absence of evidence of the ability of the measures to mitigate bycatch of razorbill since no razorbill were recorded in the HP4 trials	The Applicant acknowledges that no razorbills were caught during the HP4 LEB experimental or control trials, which likely reflects the lower abundance of this species in the region compared to guillemot. Therefore, while there is some uncertainty regarding the extent to which LEBs would reduce bycatch of razorbills, the similar ecology and feeding behaviour when compared to guillemot indicate that it is not unreasonable to expect that LEBs would also afford proportionate reductions (based on relative abundance of each species within the areas where LEBs are implemented) in levels of bycatch. The Applicant reiterates that a second year of surveys during 2022 / 23 has been undertaken for HP4 which will increase the evidence base and provide a more robust picture. Additionally, the Applicant has committed to one year of baseline monitoring of bycatch of guillemots and razorbill in the relevant gillnet fishery in order to be able to quantify the gain being made once measures are implemented (see **Table 9-3**) so, again, this would provide further evidence of vulnerability of razorbills to bycatch. Finally, it is also worth reiterating that SEP and DEP's compensation requirements are for 6 guillemot and 3 razorbill per annum and therefore, given these low

ID	Summary of Natural England and RSPB Concerns Regarding Auk Bycatch Reduction Mitigation Proposals	Applicant Observation / Response
		numbers, this is not considered to be a barrier to SEP and DEP delivering on its compensation requirements.
7	Difficulty in implementing over long timelines given the dynamic nature of fisheries	The Applicant accepts that given the potential requirement to deliver the proposed compensation measure over the 40 year operational period of SEP and DEP, there is a need for consideration of e.g. fishers retiring, boats being sold, permits being given up, vessels changing gear type etc. The 40 year operational period would represent approximately 1.5 to 2 generations of fishers and therefore, ongoing fisheries liaison and medium to long term planning to ensure the required number of vessels were signed up for implementation of REM and AWD technology over appropriate time periods would be required. However, given the current extent of gillnet fishing activity in the southwest (see **Annex 4B Auk Bycatch Reduction Feasibility Statement** [document reference 5.5.4.3]) coupled with SEP and DEP's small predicted mortalities of guillemot and razorbill (see **Section 6**), this is not considered by the Applicant to be a barrier to SEP and DEP meeting its compensation obligations throughout the Project lifetime(s), if that is required.
8	Methodological and data analysis concerns.	The Applicant would seek to work with the GGRCSG to agree methodological and data analysis approaches.
9	Inability to assess the potential scale of the measure without a proven implementation method with fully quantified and independently ratified success rates, and a quantified assessment of actual bycatch rates at the target fishery with consideration given to variation across vessels and other co-variates (e.g., gear specifics, environmental conditions).	
10	Concerns that the required scale of implementation might not be possible, i.e. there may not be enough vessels operating in relevant fisheries to adequately compensate for predicted impacts.	See **Annex 4B Auk Bycatch Reduction Feasibility Statement** [document reference 5.5.4.3], the Applicant has demonstrated that there is sufficient capacity within the gillnet fishery in the southwest to deliver on SEP and DEP's compensation requirements.
11	Need to understand the upper limits of compensation potential (i.e. the maximum number of individuals that could be saved from direct mortality as bycatch)	The Applicant acknowledges that further data is required in order to determine what the upper limits of the compensation potential may be and as described at ID 3 of this table would, if compensation is required to be implemented, provide further data on the extent of bycatch and the potential reductions afforded by the implementation of AWDs in the southwest of England, thus contributing to the overall evidence base. As noted

ID	Summary of Natural England and RSPB Concerns Regarding Auk Bycatch Reduction Mitigation Proposals	Applicant Observation / Response
		above (**Section 9.2.2**), there is a potential opportunity to collaborate on or supplement the baseline monitoring work undertaken by HP4 and the Applicant would be willing to work with HP4, Natural England and the RSPB to ensure consistent data collection and analysis methods.
12	Degree of connectivity with FFC SPA unclear, and therefore the benefit to the network.	This has been addressed through the HP4 examination including the submission of a Compensation Connectivity Note [HP4: REP3-032 and REP3-034]. Based on the evidence presented by HP4, it is concluded that guillemot and razorbill from FFC SPA are likely to use the English Channel during winter and demonstrates that there is connectivity of guillemot and razorbill from UK National Site Network populations and the south coast / English Channel. Natural England agree [HP4: REP4-056] that there is connectivity between English Channel and FFC SPA auks.

9.2.4 Delivery Mechanism

221. If compensation is deemed to be required, the Applicant proposes to sign up fishers to implement AWDs and REM systems building on the bycatch mitigation trials undertaken by Ørsted for HP4 (**Section 9.2.2**). Further details regarding how the Applicant would deliver its proposed bycatch reduction compensatory measure for auks is provided in **Annex 4B Auk Bycatch Reduction Feasibility Statement** [document reference 5.5.4.3]. The anticipated number of vessels required to implement AWDs is described in **Section 9.2.5**.

222. In addition to the use of AWDs, the Applicant would aim to support the use of a package of bycatch reduction measures in the gillnet fisheries including:

- Use of high visibility corline in the leader/tailpiece of the net (Quayle 2015); and
- Training of fishers to safely remove tangled birds to release them alive (the latter two measures already applying in Filey Bay, but not throughout the area around FFC SPA).

9.2.5 Scale

223. As set out in **Section 6.2**, the predicted annual mortality of auks from SEP and DEP for which compensation is required is extremely small: up to six guillemots and 3 razorbill (upper 95% confidence limit) or 4 guillemot and 1 razorbill (mean values). The proposed bycatch reduction compensation measure will account one to one for losses to offshore wind farm impacts, with no delay (noting that not all birds will be adults) (**Section 9.2.7**). As such, the intention remains that the Applicant will enter into contracts with fishers for the provision and use of bycatch reduction technology

no later than one year prior to operation of SEP and DEP i.e. prior to first operation of any wind turbine forming part of the authorised development.

224. As described within Ørsted (2022b) [HP4: REP1-063], questionnaires with fishers have indicated that on average 30 auks are caught as bycatch per vessel per annum. Therefore, assuming a 25% reduction in bycatch from the implementation of LEBs as determined by the 2021/22 HP4 trials (Ørsted ,2022c) [HP4: REP5-068]), a reduction in bycatch of 7.5 auks per vessel per annum could be achieved.

225. Not all auks avoiding bycatch mortality from the implementation of LEBs would be adult birds, with roughly 60% of guillemots and 52% of razorbills estimated to be made up of adult birds (based on the population ratios presented in Appendix A of Furness (2015)). Therefore, to account for the fact that some of the auks avoiding bycatch mortality would not be adult birds, the number of birds that would need to avoid bycatch mortality is increased by 40% for guillemot and 48% for razorbill. This also adds a layer of precaution to the assessment as any juvenile saved from bycatch mortality has the potential to go on to reach adulthood, increasing the biogeographic and, potentially, National Site Network breeding population.

226. **Table 9-2** provides calculations of the number of vessels that would be required to implement LEBs / AWDs for SEP and DEP based on the information that is available from the 2021 / 22 HP4 trials. The Applicant estimates that up to five vessels would be required to implement LEBs / AWDs in order to deliver the necessary scale of guillemot and razorbill compensation for SEP and DEP assuming a 1:1 compensation ratio. These calculations should be considered indicative. Ultimately, the number of fishers / vessels required will be agreed with the GGRCSG post-consent.

Table 9-2: Indicative calculations of the number of vessels that would be required to implement LEB / AWDs in order to deliver on SEP and DEP's compensation requirements assuming both the Applicant's and Natural England's preferred displacement and mortality rates

Predicted Mortality from SEP and DEP	Compensation Ratio	Number of Vessels Required to Deliver the Necessary Scale of Compensation for SEP and DEP Assuming a 25% Reduction in Auk Bycatch from Implementation of LEBs / AWDs
Applicant's preferred rates (50%, 1%)		
6 guillemot plus 3 razorbill = 9 auks + 40% and 48% respectively to account for the fact that not all bycaught auks will be adults = 12.8 auks	1:1	12.8/7.5 = up to 2 vessels
Natural England's preferred rates (70%, 2%)		
16 guillemot plus 7 razorbill = 23 auks + 40% and 48% respectively to account for the fact that not all bycaught auks will be adults = 32.8 auks	1:1	32.8/7.5 = up to 5 vessels

9.2.6 Location

227. As described in **Section 9.2.1**, during the post-application stage, the Applicant had further discussions with fisheries stakeholders in the northeast of England and ascertained that the level of set net (gillnet) fishing activity and therefore auk bycatch is unlikely to be of a sufficient scale to present a feasible compensation measure. The Applicant has therefore refocussed its efforts to the southwest of England where there is a much greater concentration of set-net fishing activity and therefore auk bycatch (Northridge *et al.,* 2020).

228.

9.2.7 Timescales

229. Quayle (2015) showed that implementation of bycatch reduction measures at Filey Bay were effective immediately in reducing bycatch there. Therefore, measures should be introduced as soon as required for compensation, and preferably as soon as possible. Because measures will reduce bycatch of adult guillemots and razorbills (as well as other age classes that are present) the compensation will account one to one for losses to OWF impacts, with no delay; however, the Applicant agrees with Natural England [RR-063] that the compensation should be targeted at the SPA adult birds and that immatures are excluded from the calculations of compensation.

230. Further information on the timescales for implementation and delivery of the compensation is provided in **Section 9.2.9**.

9.2.8 Monitoring and Adaptive Management

231. As reflected in **Section 9.2.5**, defining the spatial scale required to achieve a specific level of compensation is difficult because the scale of guillemot and razorbill bycatch remains very uncertain. Therefore, bycatch reduction needs to be measured effectively in order to inform any requirement for adaptive management to adjust measures to the appropriate spatial scale.

232. It would be necessary to monitor bycatch of guillemots and razorbills in the southwest of England gillnet fishery before and after bycatch reduction measures are implemented or, as was the approach taken by HP4, use a control study which includes certain locations where AWDs are not being used. This would enable the quantification of any gains. Monitoring will be continued at least until the success of the compensation has been demonstrated but potentially throughout the operational lifespan of SEP and DEP.

233. The requirement for adaptive management will be built into the annual programme of review through the GGRCSG.

9.2.9 Outline Implementation and Delivery Roadmap

234. The steps that would be followed by the Applicant to implement and deliver the fishery bycatch reduction measures are as follows:

- Prior to the consent being granted, consultation will be undertaken as required with all relevant stakeholders who are expected to be participants of the GGRCSG. The GGRCSG will be formally established once consent has been granted to oversee the development, implementation, monitoring and reporting of the compensation. Core members of the GGRCSG will include the MMO and Natural England. The RSPB will also be invited to participate. Key local stakeholders (e.g. Devon and Severn IFCAs, fishermens' associations and (where relevant) individual fishers will be consulted throughout the development of the proposals;
- As set out in **Section 9.2.7**, the compensation will account one to one for losses (noting that not all of these will be adult birds) to OWF impacts with no delay. It is proposed that the Applicant will enter into contract(s) with fishers for the provision and use of bycatch reduction technology (see **Annex 4B Auk Bycatch Reduction Feasibility Statement** [document reference 5.5.4.3] which describes the process that would be undertaken to identify and sign up fishers) no later than one year prior to operation of SEP and DEP i.e. prior to first operation of any wind turbine forming part of the authorised development, with the assumption at the time of writing being first power in late 2028 (**Table 9-3**). The exact timescale will be agreed with relevant stakeholders;
- The detailed delivery proposals for the agreed compensatory measures will be set out in the Gannet, Guillemot and Razorbill CIMP, which will be produced post-consent, based on the outline version provided with the DCO application (**Annex 4A Gannet, Guillemot and Razorbill Outline Compensation, Implementation and Monitoring Plan** [APP-075]) and which must be submitted to the SoS for approval in accordance with the condition wording provided in the **Proposed Without Prejudice DCO Drafting (Revision B)** [REP2-011];
- The outcomes of the bycatch reduction measures will be monitored and reported in line with the details described in **Section 9.2.8**, with the results provided to the GGRCSG on an annual basis to allow for discussion and feedback and to inform any requirement for adaptive management measures;
- Any amendments to or variations of the approved Gannet, Guillemot and Razorbill CIMP must be in accordance with the principles set out in this Gannet, Guillemot and Razorbill Compensation Document and may only be approved where it has been demonstrated to the satisfaction of the SoS that they are unlikely to give rise to any materially new or materially different environmental effects and that the required level of compensation will continue to be delivered; and
- Implementation and monitoring of vessels implementing REM systems and AWDs at least until the success of the compensation has been demonstrated, but potentially throughout the operational lifespan of SEP and DEP.

235. An outline roadmap for the implementation and delivery of the bycatch reduction measures is provided in **Table 9-3** with the purpose of showing the key activities that would be undertaken and in what order. The dates provided are indicative at this stage as the timings of key project activities and milestones e.g. consent award, FID, construction and start of operation have not yet been set.

Table 9-3: Outline Roadmap for the Implementation and Delivery of Fishery Bycatch Reduction Measures

Year from consent	Indicative calendar year based on current project timeline	Activity	2022	2023	2024	2025	2026	2027	2028
Pre-consent	2022 – 2023	Development of compensation proposals in consultation with ETG, stakeholders and fishers, including ongoing appraisal of bycatch reduction measures and site selection i.e. south and southwest coasts of England, Berwickshire coast, near the Farne Islands and Lindisfarne (Northumberland), and near FFC SPA.							
Pre-consent	Q3 2022	SEP and DEP DCO application submitted, including Gannet, Guillemot and Razorbill Compensation Plan (this document) and **Outline Gannet, Guillemot and Razorbill CIMP** [APP-075].							
Pre-consent	Q3/Q4 2022 – 2023	Ongoing engagement with statutory and non-statutory stakeholders (who are expected to be participants of the future GGRCSG) and fishers to help mature proposals pre-consent.							
Year 0	Q1 2024	Anticipated SEP and DEP consent granted							
Year 0	Q1 2024	Formally establish GGRCSG							
Year 0	2024	Selection of bycatch reduction measures to be implemented and preferred location. Identification of fishers/vessels to take part.							
Year 1	2025	Submission to SoS of Gannet, Guillemot and Razorbill CIMP							

Year from consent	Indicative calendar year based on current project timeline	Activity	2022	2023	2024	2025	2026	2027	2028
Year 1	2025	Approval of Gannet, Guillemot and Razorbill CIMP							
Year 0 / 1	2024 / 2025	Undertake one year of baseline monitoring of bycatch of guillemots and razorbills in the relevant gillnet fishery in order to be able to quantify the gain being made once measures are implemented.							
Year 2	2026	Enter into contract(s) with fishers for the provision and use of bycatch reduction technology (no later than one year prior to operation of SEP and DEP)							
Year 2	2026	Preparation of fishing gear (depending on the selected measures) and training of fishers							
Year 2	2026	Deployment of fishing gear (where relevant)							
Year 2	2026	Compensation implementation Implement annual programme of monitoring and adaptive management including annual review with GGRCSG							
Year 2	2026	Continue compensation and annual programme of monitoring and adaptive management							
Year 3	2027	Start of offshore construction at the wind farm sites							
Year 4	2028	Earliest first power at SEP and DEP							

9.2.10 Consideration of Potential Impacts from Implementation of the Compensatory Measure

236. Consideration has been given to any potential impacts that might arise as a result of the implementation of the bycatch reduction measures. The potential impacts identified are described in **Table 9-4** together with details, where relevant, of how these would be avoided, reduced or mitigated.

Table 9-4: Potential Impacts from Implementation of Bycatch Reduction Measures

Potential impacts	Details	Measures required to avoid, reduce or mitigate
Impacts on other protected areas and features	This measure will benefit other species that become entangled in set nets, such as puffin, shag, cormorant and possibly sea ducks such as eider and red-breasted merganser. It is highly unlikely to have any adverse effects on any other species or habitats.	n/a
Impacts on fishing activity	There is the potential for disturbance to existing fishing activity through the implementation of the measures.	The Applicant will put any necessary contractual arrangements in place with participating fishers and will continue a detailed process of engagement with all stakeholders ahead of selection and implementation of the measures.

9.3 Predator Eradication from a Breeding Colony

9.3.1 Overview

237. Rats and other mammalian predators are not thought to be an important influence on the breeding success or survival of guillemots and razorbills at FFC SPA. Most guillemots and razorbills in that colony nest on cliff ledges that are likely to be inaccessible to rats and other mammal predators. However, mammal predators, especially rats, have severe impacts on some seabirds, especially on islands where mammals have been introduced or have colonized. In many islands where there are no invasive mammal predators, guillemots will nest in boulder fields under large rocks, and in caves. In such habitat they are very vulnerable to invasive mammals.

238. Eradication of invasive mammal predators is a well-established procedure that has brought huge gains to seabird conservation at many sites globally. It has allowed recovery of many depleted populations of vulnerable seabirds and recolonisation of islands by seabirds that had been eradicated by invasive mammals.

239. Eradication of rats from Lundy resulted in guillemot breeding numbers increasing from 2,348 to 6,198 individuals and showing an increase in breeding distribution of this species on the island into areas that would have been accessible to rats; therefore the increase is attributed to the removal of the pressure of predation by

rats (Booker *et al.*, 2019). Clearly the Lundy case study provides strong evidence that eradication of rats can benefit guillemots in some colonies, but this may depend on the amount of boulder and cave nesting habitat (rather than cliff ledges) and whether or not guillemot numbers can increase into such habitat or are constrained by other factors such as food availability.

240. Guillemots and razorbills were affected by rat predation on Canna. After eradication of rats, there was a slowing of the rate of decline of the guillemot population, but it was considered that some other factors prevented that population from recovering despite removal of the predation by rats (Luxmoore *et al.*, 2019). Numbers of breeding razorbills showed a sharp jump in 2006, and this was attributed by Luxmoore *et al.* (2019) to a reduction in predation by rats. Luxmoore *et al.* (2019) noted that after eradication of rats, razorbill eggs were laid in areas that had previously been clear of nesting because of the presence of rats. As with Lundy, removal of rats resulted in razorbills being able to move into suitable nesting habitat from which they had previously been excluded by rats.

241. After eradication of rats at Ailsa Craig, guillemots and razorbills spread into boulderfield habitat from which they had previously been excluded by the presence of rats (B. Zonfrillo, pers. comm., Zonfrillo, 2001). At the Shiants, razorbill breeding success was higher on average in each of the post eradication years compared to the pre-eradication year (RSPB, 2019).

242. Ørsted (2022d) has assessed the potential to provide compensation for impacts of Hornsea Four OWF on auks by eradicating rats from seabird colonies in the Bailiwick of Guernsey (Channel Islands). They found that despite many islands appearing to have good habitat for guillemot and razorbill, there seems to be suppression of populations of these species by the presence of rats. They concluded that their predator eradication implementation study showed that islands in the Bailiwick of Guernsey were therefore suitable for predator eradication as compensation, and that "*it is also apparent that the required quantum of compensation in terms of nesting space for guillemot and razorbill can also be provided at the locations considered in the Bailiwick of Guernsey*".

9.3.2 Delivery Mechanism

243. The Applicant is only proposing delivery of this measure as part of a collaborative delivery model, whereby the Applicant would seek to deliver the measure as compensation or adaptive management through a partnership arrangement with one or more other OWF developers. This measure represents an alternative compensation option that would be delivered wholly or partly in place of the measures outlined in **Sections 9.1** and **9.2** above. To ensure this option is available to SEP and DEP, the Applicant has included wording to this effect within the Draft DCO outlined in the **Proposed Without Prejudice DCO Drafting (Revision B)** [REP2-011]. Further details are set out in the **Strategic and Collaborative Approaches to Compensation and Measures of Equivalent Environmental**

Benefit [APP-084] and the **Habitats Regulations Assessment Derogation and Compensatory Measures Update (Revision B)** [document reference 13.7].

10 Summary

244. A range of compensatory measures for gannet, guillemot and razorbill from FFC SPA have been considered by the Applicant, with reference to the relevant guidance and informed through a detailed process of pre-application consultation with stakeholders. A package of compensation measures with different delivery models is proposed.

245. For gannet these are:

- Enhance the conservation of wintering and migrant shorebirds and waterfowl at Loch Ryan, Scotland (a non like-for-like compensation option with project-led delivery); and
- Bycatch reduction research proposal – better establish the scale and pattern of bycatch and investigate reduction measures (project-led delivery).

246. For guillemot and razorbill these are:

- Prey enhancement through sandeel stock recovery and ecosystem-based management (strategic delivery); and
- Fishery bycatch reduction (project-led delivery).

247. The inclusion of a package of measures, as advocated by stakeholders, helps to respond to any uncertainties in the delivery or implementation of each of the proposed measures when considered on their own and therefore adds resilience to the overall approach.

248. Both the gannet bycatch reduction research proposal and the guillemot and razorbill fishery bycatch reduction measures have been identified by the Applicant as measures that could also be taken forward as part of a collaborative delivery model, whereby the Applicant would seek to deliver compensation (or adaptive management) through a partnership arrangement with one or more other OWF developers.

249. In addition, predator eradication from a breeding colony in relation to guillemot and razorbill has been identified by the Applicant as measure that could be taken forward as part of a collaborative delivery model, whereby the Applicant would seek to deliver compensation (or adaptive management) through a partnership arrangement with one or more other OWF developers.

250. A further option for a contribution to be made to a Strategic Compensation Fund (such as the Marine Recovery Fund) wholly or partly in place of the Applicant's proposed measures outlined above or as an adaptive management measure is also proposed.

251. The information provided demonstrates how the proposed measures can be secured and that the mechanism for delivery can be implemented. The Gannet,

Guillemot and Razorbill CIMP will set out the detailed delivery proposals for the agreed compensatory measures based on those set out in this Gannet, Guillemot and Razorbill Compensation Document and will be produced by the Applicant and approved by the SoS prior to the start of construction.

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