CALEDONIA
Offshore Wind Farm

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Application Document 15

Appendix 15-3 Caledonia North Compensation Plan and Site Selection

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Acronyms and Abbreviations

AEoSI	Adverse Effect on Site Integrity
ANS	Artificial Nesting Structure
AOB	Apparently Occupied Burrows
AON	Apparently Occupied Nests
BED	Bird Scaring Device
BMP	Bycatch Monitoring Programme
BTO	British Trust for Ornithology
CRM	Collision Risk Modelling
HPAI	Highly Pathogenic Avian Influenza
HRA	Habitat Regulations Appraisal
ICES	International Council for the Exploration of the Seas
IMP	Implementation and Monitoring Plan
LEB	Looming Eye Buoy
MD-LOT	Marine Directorate - Licensing Operations Team
MMFR	Mean Max Foraging Range
MOU	Memorandum of Understanding
MRF	Marine Recovery Fund
NEEOG	North-East and East Ornithology Group
OWF	Offshore Wind Farm
PVA	Population Viability Analysis
RSPB	Royal Society for the Protection of Birds
SD	Standard Deviation

SEPA	Scotland's Environment Protection Agency
SMEEF	Scottish Marine Environmental Enhancement Fund
SMP	Seabird Monitoring Programme
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SST	Sea Surface Temperature

1 Introduction

1.1 Project Background

1.1.1.1 This appendix provides details regarding the Compensation Plan and Site Selection for the Proposed Development (Offshore), specifically to inform the Caledonia North application, located in the Moray Firth, Scotland. This appendix supports the Caledonia North Derogation Case (Application Document 15: Caledonia North Habitats Regulations Appraisal Derogation Case).

1.1.1.2 The Proposed Development (Offshore) will be developed in two phases (see Volume 1, Chapter 5: Proposed Development Phasing), referred to as Caledonia North and Caledonia South. The Array Areas of the two phases are referred to as the Caledonia North Site and the Caledonia South Site, with the combined Array Areas referred to as the Caledonia Offshore Wind Farm (OWF). It is assumed that construction of the two application areas could be progressed in either order (e.g., Caledonia North constructed in the first phase, then Caledonia South in the second phase, or vice-versa) or at the same time. This has been assessed within a single Report to Inform Appropriate Assessment (RIAA) covering Caledonia North and Caledonia South in isolation, as well as the Proposed Development (Offshore) (i.e., Caledonia North and Caledonia South combined).

1.2 Derogation

1.2.1.1 The Caledonia North RIAA (Application Document 13), through apportioning, in-combination assessments and population viability analysis (PVA), concluded that the Proposed Development (Offshore) could have an Adverse Effect on Site Integrity (AEoSI) on a number of Special Protection Area (SPA) seabird populations when impacts from the Proposed Development (Offshore) are considered in-combination with other projects. For this reason, the application for Caledonia North is supported by a derogation case, including the development of compensation measures for black-legged kittiwake (hereafter kittiwake) *Rissa tridactyla*, Northern gannet (hereafter gannet) *Morus bassanus*, common guillemot (hereafter guillemot) *Uria aalge*, and Atlantic Puffin (hereafter puffin) *Fratercula arctica*. For guillemot and puffin, this derogation case is without prejudice, based on the fact that the Applicant Approach in the RIAA concluded no AEoSI for those two species.

1.3 Compensation Measure Development

1.3.1.1 The Scottish Government's Marine Directorate produced process guidance on ornithological compensatory measure development for offshore wind (DTA, 2021[1]), including a proposed stepwise approach to the identification and delivery of compensation measures (Figure 1-1).

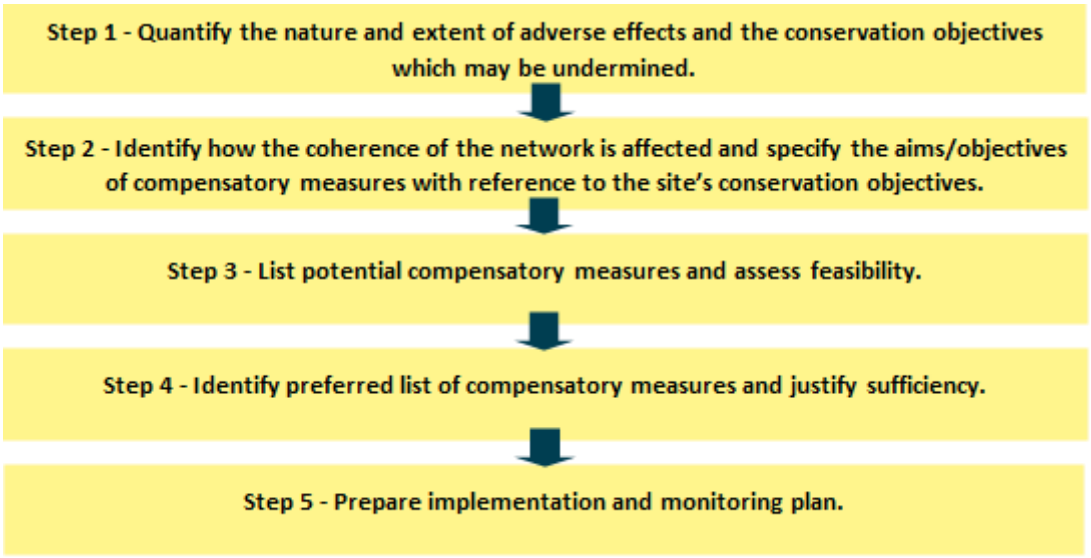

Figure 1-1: Stepwise approach to the identification and delivery of compensatory measures, as proposed in the Marine Directorate's guidance on ornithological compensatory measure development for offshore wind (adapted from DTA, 2021[1]).

1.3.1.2 Caledonia Offshore Wind Farm Ltd (the Applicant) has applied the DTA (2021[1]) framework to develop compensation measures for the Proposed Development (Offshore). Step 1 of the work (Figure 1-1) is quantified as part of the completion of collision risk modelling (CRM), distributional responses assessment, apportioning and PVA (conducted as part of the project Habitats Regulations Appraisal (HRA) process for the Proposed Development (Offshore)).

1.3.1.3 The remainder of Step 1 (outlining conservation objectives which may be undermined), Step 2, Step 3 and 4 are provided in the compensation measure long list and short list report (Application Document 15, Appendix 15-2: Caledonia North Compensation Long List and Short List). That document also contains, for each at-risk species, an ecological description and information on pressures facing the species, including details on threats faced by the species, as well as context on population size, distribution and trends.

1.3.1.4 This appendix reports on the development of, and evidence for the shortlisted compensation measures (i.e., justify sufficiency as per Step 4 of the stepwise approach), by setting out:

- Predicted impacts and compensation quanta (Section 2);
- Information on the process and conclusions of longlisting and shortlisting of compensation measures (Section 3);
- Detail on the shortlisted measures and evidence for their effectiveness and feasibility (Section 4). This also includes consideration of wider ecological implications around the implementation of the measure, as requested by NatureScot during consultation on 1 July 2024;
- Approach to site selection for compensation measures and sites identified as part of preliminary site selection investigations (Section 5);
- Adaptive Management outline and next steps for compensation development (Section 6)

1.3.1.5 This appendix is accompanied by the Caledonia North Outline Implementation and Monitoring Plan (IMP) (Application Document 15, Appendix 15-4) which provides detail on the formation of a steering group and outlines the proposed approach to the implementation, monitoring and adaptive management of the compensatory measures.

1.4 Collaborative and Strategic Compensation

1.4.1.1 It should be noted that the Applicant is investigating opportunities for the joint, collaborative delivery of compensation measures with other developers. Therefore, the Applicant may propose to deliver any of the measures set out in this document as (part of) a joint compensation scheme. Plans for any such joint scheme would be consulted upon with relevant stakeholders, developed in close collaboration with a steering group, and set out in the IMP.

1.4.1.2 An alternative to the developer-led measures presented in this report, is to provide a contribution to a strategic compensation programme. Such strategic compensation can be delivered in the form of compensation delivered by public authorities, as well as marine recovery funds which may fund compensation. Legislatively provisions for the delivery of such strategic compensation delivery are provided in Energy Act 2023 (Part 13 Chapter 1, Sections 290 to 295), which include the potential to alter assessment requirements in the context of compensation delivery. This may be of relevance to European sites in the future. The Applicant notes the ecological, logistical and financial benefits of delivering compensation at a strategic level, including the potential to deliver significantly greater environmental value compared with individual project-level compensation packages. The Applicant is therefore committed to continue to monitor and be involved in strategic level compensation initiatives.

1.4.1.3 There are a number of workstreams currently being undertaken which could aid in the delivery if strategic compensation measures and/or funding schemes in the UK. These include:

- The Marine Recovery Fund (MRF);
- Scottish Marine Environmental Enhancement Fund (SMEEF); and
- Regional measures:
    - The Applicant is contributing to strategic, regional compensation plans as part of the North-East and East Ornithology Group (NEEOG) of ScotWind developers.

1.4.1.4 The Applicant continues to engage in the development of regional and national compensation measures, however, it is noted that due to the timing of the application submission, the Applicant is unable to depend on these regional measures at this time. The Applicant would consider contributing to a strategic compensation fund or regional compensation measures if given the opportunity, as and when a pathway comes available. The Applicant would contribute in addition to, or instead of, the Applicant's proposed measures outlined above, or alternatively as an adaptive management measure. Any such use of future strategic measures would be consulted upon with relevant stakeholders and set out in the IMP.

2 Predicted Impacts and Compensation Quanta

2.1 Predicted Impacts

2.1.1.1 The nature and extent of the predicted impacts (for the Proposed Development (Offshore) alone), with reference to the sites' conservation objectives, were set out in Application Document 15, Appendix 15-2: Caledonia North Compensation Long List and Short List, and are summarised in Table 2-1. Both the Applicant and Statutory Nature Conservation Bodies (SNCB) Guidance approaches to the assessment are shown (see Application Document 13: Caledonia North Report to Inform Appropriate Assessment for full details and results from the assessments).

2.1.1.2 All sites and species outlined in Table 2-1 are thus included in the derogation case for Caledonia North (without prejudice for those species for which the Applicant Approach concluded No AEoSI, namely guillemot and puffin).

Table 2-1: Project alone predicted additional annual mortality, for those sites and species for which Adverse Effects on Site Integrity could not be ruled out in-combination with other projects for the Proposed Development (Offshore), presenting the lower and upper limits of the Guidance Approach.

Species	Site	Scale of Potential Effect (Predicted Additional Annual Adult Mortality) – Guidance Approach			Scale of Potential Effect (Predicted Additional Annual Adult Mortality) – Applicant Approach		
		Proposed Development (Offshore)	Caledonia North	Caledonia South	Proposed Development (Offshore)	Caledonia North	Caledonia South
Kittiwake	East Caithness Cliffs SPA	15.88 - 19.05	5.85 - 7.01	12.16 - 14.55	N/A*	N/A*	N/A*
	Troup, Pennan & Lion's Head SPA	6.48 - 7.77	2.38 - 2.85	4.96 - 5.94	N/A*	N/A*	N/A*
	Buchan Ness to Collieston Coast SPA	2.31 – 2.77	0.88 - 1.06	1.75 - 2.10	N/A*	N/A*	N/A*
	Total	24.67 - 29.59	9.11 - 74.01	18.87 - 22.59	N/A*	N/A*	N/A*
Guillemot	East Caithness Cliffs SPA	124.19 – 222.16**	53.04 - 91.64	89.19 - 161.75	No AEoSI***	No AEoSI***	No AEoSI***
Puffin	Sule Skerry and Sule Stack SPA	11.03 -18.37	7.00 - 11.68	6.47 - 10.78	No AEoSI***	No AEoSI***	No AEoSI***
Gannet (Guidance Approach to macro-avoidance)[1]	Forth Islands SPA	4.48 - 8.12	1.66 - 3.00	3.51 - 6.13	4.48	1.66	3.51
Gannet (Applicant Approach to macro-avoidance)[2]	Forth Islands SPA	2.74 – 6.38	1.06 – 2.40	2.03 – 4.66	2.74	1.06	2.03

Species	Site	Scale of Potential Effect (Predicted Additional Annual Adult Mortality) – Guidance Approach			Scale of Potential Effect (Predicted Additional Annual Adult Mortality) – Applicant Approach		
		Proposed Development (Offshore)	Caledonia North	Caledonia South	Proposed Development (Offshore)	Caledonia North	Caledonia South
Applicant Approach impacts shown where applicable. Full details available in the Caledonia North RIAA (see Application Document 13). [1]As agreed in consultation a macro-avoidance rate of 70% has been applied to gannet densities during the non-breeding season. During the breeding season, the monthly in-flight densities have not been adjusted for macro-avoidance. This approach has been presented as the Guidance Approach. [2]The Applicant Approach has also been presented, with the 70% macro-avoidance rate applied to the predicted mortalities in all months. *No Applicant approach submitted for kittiwake; **Only upper limited of Guidance Approach reached AEoSI in-combination with other projects for the Proposed Development (Offshore); ***No effect predicted as AEoSI ruled out in-combination with other projects for the Proposed Development (Offshore) for the Applicant Approach – full predicted mortality figures, including for those instances where AEoSI was ruled out, available in RIAA.							

2.2 Compensation Quanta

2.2.1.1 The numbers presented in Table 2-1 represent the impacts on breeding adults that need to be compensated for each year of the operational phase of the project (based on a 1:1 ratio).

2.3 Compensation Ratios

2.3.1.1 Compensation ratios are defined within Scottish guidance (Butler *et al*., 2024[2]) as:

"The ratio between the magnitude of compensation required and the estimated level of adverse impact. Compensation ratios are used in order to account for uncertainty, with the aim of ensuring that the magnitude of the benefit provided by compensation will, in reality, be at least as great as the level of adverse impact".

2.3.1.2 According to the Scottish guidance, "it is accepted that compensation ratios should be well in excess of 1:1" with higher compensation ratios often linked to greater risks of harm, uncertainties, or delays in achieving ecological outcomes (DTA, 2021[1]). Several examples of compensatory measure ratios were provided within the Scottish guidance, ratios ranged between 1:1 to 100:1. It is important to note these examples are not directly related to ornithological compensation, and thus guidance on proposed ratios for ornithological compensation in Scotland is limited.

2.3.1.3 The compensation ratios for the measures implemented to offset impacts from Caledonia North will be above 1:1. Following further refinement and development of the compensation measures (see next steps and roadmaps in Section 6), appropriate ratios to meet compensation requirements (i.e., to offset predicted impacts) can be calculated based on the selected measure and its design, location and wider characteristics. Proposed ratios will be consulted and decided upon in collaboration with key stakeholders post-application, as part of the steering group process and IMP development (see Application Document 15, Appendix 15-4: Caledonia North Outline Implementation and Monitoring Plan). For context, Table 2-2 presents the compensation ratios for ornithological compensation set out at application by recent Scottish OWF projects, namely Berwick Bank, Green Volt and Ossian.

Table 2-2: Summary of the compensation measures and ratios proposed by Berwick Bank, Green Volt and Ossian OWFs.

Species	Compensation Required	Compensation Measure	Compensation Ratio
Green Volt OWF			
Kittiwake	74 breeding adults	Drainage Management (East Caithness Cliffs SPA- Ashy Geo) Disturbance reduction (Troup Head/Collie Head)	"Greater than 1:1"
Gannet	7.6 breeding adults	Disturbance reduction (Troup Head/Collie Head)	"Greater than 1:1"
Guillemot	68.6 breeding adults	Drainage Management (East Caithness Cliffs SPA- Ashy Geo) Disturbance reduction (Troup Head/Collie Head)	"Greater than 1:1"
Razorbill	4.2 breeding adults	Drainage Management (East Caithness Cliffs SPA- Ashy Geo) Disturbance reduction (Troup Head/Collie Head)	"Greater than 1:1"
Puffin	0.8 breeding adults	Tree mallow removal	"Greater than 1:1"
Berwick Bank OWF			
Kittiwake	147 breeding adults	Rat eradication and biosecurity (Handa) Wardening and management of non-SPA colony (Dunbar) Sandeel Fisheries compensation	*No available info on proposed ratios found*
Guillemot	577 breeding adults	Rat eradication and biosecurity (Handa) Sandeel Fisheries compensation	*Ratios for rat eradication not yet confirmed by Berwick Bank* 1:7 (Sandeel fisheries compensation) estimated
Razorbill	160 breeding adults	Rat eradication and biosecurity (Handa) Sandeel Fisheries compensation	*Ratios for rat eradication not yet confirmed by Berwick Bank*

Species	Compensation Required	Compensation Measure	Compensation Ratio
Puffin	44 breeding adults	Rat eradication and biosecurity (Handa) Sandeel Fisheries compensation	1:40 (Sandeel Fisheries compensation) estimated
Ossian OWF			
Kittiwake	7.0-33.0 adults	American mink control in Scotland	"Above 1:1", ranging from 1:6 to 1:39 depending on delivery site
Gannet	28.8-62.4 adults	Seabird bycatch reduction in Portugal	"Above 1:1"
Razorbill	4.8-28.4 adults	American mink (*Neovison vison*) control in Scotland Seabird bycatch reduction in Portugal	"Above 1:1", ranging from 1:2 to 1:16 depending on delivery site for mink control.

2.4 Measure-specific Compensation Requirement

2.4.1.1 The numbers presented in Table 2-1 represent the impacts on breeding adults that need to be compensated for. Some compensation measures (e.g., bycatch reduction) benefit breeding adults directly (as well as immature birds) by improving adult survival rates and thus maintaining a larger adult breeding population. However, other measures focus on growing the population through increasing the numbers of nests and/or fledglings, which then mature to adulthood to increase the adult breeding population (e.g., nest site creation, predator eradication). When measures do not benefit adult birds directly, additional calculations are needed to determine scale of compensation required for that measure in order to recruit the equivalent number of impacted adults into the breeding population. Calculations use published data on productivity (number of chicks raised per nest), and survival to adulthood (proportion of chicks that survive to breeding age) to determine multiplication factors to apply to the compensation requirements to account for this seabird maturation process.

2.4.1.2 For those measures which are taken forward as part of the next steps of compensation development, these calculations and measure-specific compensation requirements will be included in the IMP (see Application Document 15, Appendix 15-4: Caledonia North Outline Implementation and Monitoring Plan).

3 Long List and Short List of Measures

3.1.1.1 As outlined in Section 1.3, the Scottish Government's Marine Directorate guidance (DTA, 2021[1]) was applied to develop ornithological compensatory measures. For the steps of the proposed approach, see Figure 1-1.

3.1.1.2 In the case of SPA qualifying features for which AEoSI could not be ruled out, a long list and short list of potential compensation measures was created in accordance with the guidance stepwise approach (Figure 1-1) as follows:

- The conservation objectives at risk of being compromised, as well as the predicted nature and extent of impact(s) on relevant SPA qualifying features were collated (Step 1);
- Information was collated on species ecology and impacts on network coherence. This included background ecological information, Scottish and UK population trends, known pressures, existing site management practices, predicted impacts and links to site network coherence (Step 2);
- To complete Step 3, a compensation measure long list was created, adapted from the initial strategic compensation long list for the NEEOG ScotWind Projects (Pizzolla *et al.,* 2024[3]). The adapted long list is accompanied by a feasibility assessment for each potential measure by species, with feasibility categories based on the DTA (2021[1]) guidance; and
- Finally, a short list was identified based on the findings from the feasibility assessment of the long list (Step 4).

3.1.1.3 Full details on the longlisting and shortlisting can be found in Application Document 15, Appendix 15-2: Caledonia North Compensation Long List and Short List.

3.1.1.4 The short list of potential compensation measures taken forward for further consideration and development is:

- Reduction of disturbance at colony (all species);
- Mammalian predator management and eradication (all species);
- Non-lethal avian predator control (guillemot and puffin);
- Bycatch mitigation (gannet and guillemot);
- Restoration or maintenance of breeding sites (puffin); and
- Conservation management funding (all species).

4 Proposed Measures and Ecological Evidence

4.1 Introduction

4.1.1.1 This section discusses the short list of potential compensation measures taken forward in further detail. It then sets out the evidence for effectiveness and feasibility considerations for each measure. For each measure, the following factors are set out:

- Introduction – a brief overview of what the measure entails;
- Ecological evidence – literature evidence that the species is impacted by the threat which the measure looks to address;
- Wider ecological considerations – a summary of indirect impacts (positive or negative) of the proposed measure on other species;
- Timing of delivery – an indication of how long after deployment the implemented measure will begin compensating for the predicted impacts;
- Monitoring – an overview of likely monitoring requirements for the measure;
- Adaptive management – a brief discussion of adaptive management approaches relevant to the measure;
- Feasibility, consisting of the following subsections:
    - Technical feasibility – evidence for effectiveness, including information on deployment of the measure at other locations and/or for the same or other species. A qualitative assessment, based on expert judgement, of the technically feasibility to deploy the measure for this project, including a consideration of the certainty of success of the measure;
    - Financial feasibility – a qualitative assessment to assess whether it is reasonable to assume that it will be feasible for the Applicant to bear the costs for the development, deployment, upkeep and monitoring of the measure (and any adaptive management measures, should these be required); and
    - Legal feasibility – a brief discussion of the key legal obstacles that will need to be cleared in order for the measure to be deployed.

4.1.1.2 It should be noted that this list of shortlisted measures is subject to further refinement. The Applicant envisages that a subset of these measures will be taken forward for implementation following further research and a site selection and stakeholder engagement process. See Section 6 for further details on next steps.

4.1.1.3 During stakeholder consultation, both NatureScot and the Applicant expressed a preference for a flexible approach to the development of compensation measures, and a willingness to explore novel options for compensation. At the time of writing the measures presented in this document are appropriate, however the Applicant aims to use a pragmatic approach to the development of compensation measures, and should an additional potential compensation measure be identified, this may be taken forward for further development alongside the currently shortlisted measures (and consulted/reported upon as part of the IMP process – see Application Document 15, Appendix 15-4: Caledonia North Outline Implementation and Monitoring Plan). This short list therefore does not represent a final list.

4.2 Kittiwake

4.2.1 Overview

4.2.1.1 Discussed below is the short list of potential measures deemed suitable to be taken forward for next steps for compensation development for kittiwake:

- Reduction of disturbance at colonies;
- Mammalian predator management and/or eradication; and
- Non-lethal avian predator control.

4.2.2 Reduction of Disturbance at Colonies

Introduction

4.2.2.1 Anthropogenic disturbance is caused by the presence of external stimuli (such as people, pets and vehicles) within close proximity to colonies, resulting in temporary flushing or permanent abandonment of nesting sites, as well as reducing time for the acquisition of resources and allowing nests to be targeted by predators (Carney and Sydeman, 1999[4]; Buckley, 2004[5]; Frederiksen, 2010[6]).

4.2.2.2 Reduction measures that can be implemented include the introduction of wardens, signage, path diversions and path maintenance (Allbrook and Quinn, 2020[7]). The overarching aim of these disturbance reduction measures is to increase productivity by reducing both direct mortality effects (e.g., increased egg/chick predation) and long-term impacts on physiological stress caused by human disturbance on nesting seabirds.

Ecological Evidence

4.2.2.3 Disturbance is known to be a major threat to seabirds (Dias *et al.,* 2019[8]). Adult kittiwake were observed abandoning their nests in response to human disturbance and in turn an increased daily chick loss was reported (Sandvik and Barrett, 2001[9]). Furthermore, as per Beale and Monaghan (2004[10]), human disturbance had a negative effect on the nesting success of kittiwake at St Abbs Head SPA. It was also noted that kittiwake exhibit a greater sensitivity to disturbance due to their closer proximity to visitors compared to other seabird species at the site, such as guillemot. Further evidence of kittiwake in Scotland being disturbed by human activities was provided as part of the Berwick Bank Offshore Wind Farm compensation case, which showed local and anecdotal evidence of disturbance at Dunbar Castle (SSE Renewables, 2022[11]).

4.2.2.4 There is evidence to suggest that kittiwake are impacted by human disturbance and as such could benefit from the implementation of management at colonies. There are a range of disturbance reduction measures that can be implemented at seabird colonies including wardens, signage, path diversions and path maintenance (Allbrook and Quinn, 2020[7]).

Wider Ecological Considerations

4.2.2.5 As disturbance is known to be a major threat to a range of seabird species (Dias *et al.,* 2019[8]), disturbance-reducing measures are also likely to benefit species other than kittiwake.

4.2.2.6 The potential negative consequences of disturbance reduction should also be considered. For example, disturbance-reducing measure may also reduce disturbance of predator species such as herring gull (*Larus argentatus*) meaning they could increase in number and thus increase predation on kittiwake or other seabirds (Sandvik & Barrett, 2001[9]). Thus, the presence of nearby colonies of avian predators and their potential response to disturbance-reduction measures should be considered.

Timing of Delivery

4.2.2.7 As outlined in the feasibility sections below, there are existing, well-evidenced disturbance-reducing measures for seabirds, and the measures (e.g., closures, diversions, signage, warden employment) are straightforward to implement from both a technical and legal perspective. The measure can therefore be readily implemented as soon as site selection and any partnership agreements/contracts have been secured – there is thus no technical lead-in time (i.e., the measure will start delivering benefits immediately upon its implementation). It should be acknowledged that this measure targets an increase in seabird productivity (i.e., numbers of chick fledged per pair). There is thus an inevitable

ecological time delay between implementing the measure and additional fledged birds reaching breeding age. For kittiwake it takes four years for any fledged juvenile to reach breeding age (Horswill and Robinson, 2015[12]). Whilst, as outlined above, there is no technical lead-in time for this measure to become effective, implementation is therefore recommended prior to operation to minimise or avoid a build-up of temporary compensation debt of adult birds (whilst awaiting birds to reach adulthood) during the early years of implementation. It should also be noted that disturbance-reducing measures, once implemented and if maintained, could deliver ongoing benefits after the decommissioning of the offshore wind farm, thus potentially providing a positive impact beyond the 35-year consent period, and providing further confidence that sufficient compensation can be delivered for the potential impacts incurred during the operational lifetime.

Monitoring

4.2.2.8 In order to successfully monitor and quantify this measure, baseline surveys as well as post implementation surveys of the measure would need to be undertaken to identify the levels of anthropogenic disturbance.

4.2.2.9 The success of the measure in reducing for example footfall, and potentially disturbance events (e.g., flushing) can be measured and monitored quantitatively. Attributing a growth in adult breeding population, or an improvement in productivity, to the disturbance reducing measure is considered to be challenging due to the indirect nature of this measure. Monitoring of the success of the measure would therefore require a combination of quantitative and qualitative evidence. Annual counts and productivity measurements would be made at the candidate site(s) following their identification, with monitoring continuing following the implementation of measures.

Adaptive Management

4.2.2.10 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective.

4.2.2.11 Examples of appropriate adaptive management for the disturbance reduction measure could include i) extending the measure through the implementation of additional signage, path diversions, wardens etc., ii) expanding the measure to cover a larger area and/or additional sites, and/or iii) extending the duration of disturbance reduction measures.

Feasibility

Technical Feasibility

4.2.2.12 Several publications have reported the effectiveness of disturbance-reducing measures at breeding bird colonies. Lynch *et al.* (2017[13]) showed wardens; fencing and signage were effective in reducing disturbance of little tern (*Sternula albifrons*). Dowling and Weston (1999[14]) showed fencing, signage, temporary beach closures and wardens helped reduce disturbance of hooded plover (*Thinornis rubricolli*). Similarly, signs, fencing and wardens have also been shown to be an effective measure in reducing anthropogenic disturbance of breeding shorebirds (Weston *et al*., 2012[15]). Allbrook and Quinn (2020[7]) reported on the implementation of signs as a measure to reduce disturbance of gannet. Furthermore, Buxton *et al*. (2017[16]) proposed the use of signs to implement 'quiet zones' to reduce the effects of visitor noise on nesting Brandt's cormorants (*Phalacrocorax penicillatus*), following evidence of the effectiveness of signs reported by Stack *et al*. (2011[17]). Set-back distances or buffer zones have been also applied to reduce the disturbance of wetland birds (Rodgers and Smith, 1997[18]; Rodgers and Schwikert, 2002[19]) and nesting seabirds (e.g., Pfeiffer and Peter, 2004[20]). Lafferty *et al*. (2006[21]) also reported on the effectiveness of rope fencing, signs and volunteers protecting nesting snowy plover (*Charadrius alexandrines nivosus*).

4.2.2.13 Further research would be needed to identify if and at which SPAs/colonies human disturbance is impacting populations and to identify suitable colonies where (additional) disturbance-reducing measures would be beneficial (for further information on site selection see Section 5 and 6).

4.2.2.14 Measures could be implemented collaboratively between the Applicant and site managers and/or landowners, or strategic funding for implementation and monitoring of the measure can be provided to sites where disturbance is an impact at a site and where management plans are in place but have limited funding or resources to implement successful measures.

4.2.2.15 Based on qualitative assessment using expert judgement, and the successful implementation of reduction of disturbance at seabird colonies, it is deemed technically feasible to implement this proposed measure for this project, with a high likelihood of success if implemented at appropriate sites.

Financial Feasibility

4.2.2.16 This measure is considered financially feasible; the full financial cost of the measure will depend on the type of site management taken forward. The measure could be implemented either through funding of wardens at the site or through the funding of contractors and other associated costs to design and install measures (e.g., signage and fencing).

Legal Feasibility

4.2.2.17 This measure is likely straightforward from a legal perspective. Prior to consent, liaison with site managers and/or landowners would be required to reach agreements. Land rights are not anticipated to be required.

4.2.3 Mammalian Predator Management and Eradication

Introduction

4.2.3.1 Predation by invasive non-native mammals is considered a key threat to breeding seabird colonies (Brooke *et al.*, 2018[22]). Mammals such as brown and black rats (*Rattus norvegicus*, *Rattus rattus*), feral cats (*Felis catus*) and Mustelidae such as American mink are all known to predate seabird eggs, chicks and adults (Latorre *et al.*, 2013[23]; Craik, 1997[24]; Ratcliffe *et al.*, 2010[25]).

4.2.3.2 This measure would involve lethal or non-lethal predator control measures at a breeding colony to reduce nest predation and increase breeding success. Lethal control involves for example the use of rodenticide or other poison bait, placed within bait boxes (Zonfrillo, 2001[26]). Non-lethal control, such as the use of exclusion fencing can also be appropriate for certain sites and predators (Dalrymple, 2023[27]). It should be noted predator eradication programmes tend to be effective on islands, with predator exclusion measures, such as fencing for larger mammals, more suitable at mainland colonies.

4.2.3.3 The overarching aim of predator control measures is to reduce direct mortality effects of mammalian predation on nesting seabirds (i.e., predation on eggs, chicks or adults) and as such increase productivity and the breeding population size.

Ecological Evidence

4.2.3.4 There is limited evidence of mammalian predation affecting nesting kittiwakes, as this species nest on narrow ledges on steep cliffs, reducing the risk of predation by predators like rats, since the nesting locations are inaccessible (Luxmoore *et al.*, 2019[28]; Furness, 2021[29]). However, their small size does make them more vulnerable to mammalian predators than larger seabirds (Eveillard-Buchoux and Beninger, 2022[30]). There is evidence to suggest that predation of kittiwake by brown rats and cats at colonies on the Isles of Scilly, by mink at St Abb's Head and by foxes at Lowestoft reduced breeding productivity (Furness *et al.*, 2013[31]).

4.2.3.5 There is a substantial evidence base for the effectiveness of predator reduction programmes for seabirds, as set out in the technical feasibility section below.

4.2.3.6 The suitability of this measure for kittiwake will be dependent on the specific situation at colonies such as the accessibility of nesting sites to predators. Therefore, further research is required to establish predator pressures on kittiwake at Scottish colonies.

4.2.3.7 To ensure effectiveness is maintained upon completion of eradication or exclusion, biosecurity measures would be implemented alongside mammalian predator management and/or eradication to secure benefits obtained from the eradication programmes.

Wider Ecological Considerations

4.2.3.8 Population declines of various bird species have been attributed to predation by mammals (Doherty *et al.*, 2016[32]). Within the UK and Ireland, there is evidence to suggest red foxes (*Vulpes vulpes*) predate on gull chicks, eggs, and adults (Mavor *et al.*, 2001[33]). Davis *et al.* (2018[34]) indicated that herring gull productivity significantly decreased as fox sightings increased, and that predator fencing appeared to be effective in increasing herring gull breeding productivity.

4.2.3.9 Brown and black rats were eradicated from Lundy Island in the Bristol Channel between 2002 to 2004 as part of a project to improve conditions on the island for puffin and European storm petrel (*Hydrobates pelagicus*). Following the removal of the rats from the island guillemot and razorbill populations increased by 321% and 272%, respectively, between 2000 (before eradication) and 2021 (after the island was declared rat free) (Ørsted, 2021b[35]). Populations of guillemot and razorbill at neighbouring colonies, namely Skomer and Castlemartin Coast, also saw a percentage increase of 79% and 94% (guillemot) and 93% and 32% (razorbill) between 2000 to 2017, respectively (Ørsted, 2021b[35]).

4.2.3.10 There is also increasing evidence of the effectiveness of removal or control of mammalian predators to increase breeding success and adult survival at seabird colonies around the world including islands around New Zealand (Towns and Broome, 2003[36]; Rayner *et al.*, 2007[37]).

4.2.3.11 Further examples from various seabird breeding colonies include Cooper *et al.* (1995[38]); Keitt and Tershy (2003[39]); Williams, Byrd and Konyukhov (2003[40]) and Brooke *et al.* (2018[22]).

4.2.3.12 Given the evidence presented above it is feasible that the implementation of a predator control/eradication measure can, in time, deliver substantial benefits for the wider national site network/Natura 2000 network and for a wider range of seabirds.

Timing of Delivery

4.2.3.13 As outlined in the feasibility sections below, there is extensive technical and legal precedent for mammalian predator eradication across the UK. The measure can therefore be readily implemented, using current guidelines and best practice, as soon as site selection, legal permissions and contracts have been secured. It should be acknowledged that this measure targets an increase in seabird productivity (i.e., numbers of chick fledged per pair). There is thus an inevitable ecological time delay between implementing the measure and additional fledged birds reaching breeding age. For kittiwake it takes four years for any fledged juvenile to reach breeding age (Horswill and Robinson, 2015[12]). Whilst, as outlined above, there is no technical lead-in time for this measure to become effective, implementation is therefore recommended prior to operation to minimise or avoid a build-up of temporary compensation debt of adult birds (whilst awaiting birds to reach adulthood) during the early years of implementation. It should also be noted that eradication and control measures, once implemented and if maintained with biosecurity, could deliver ongoing benefits long after the decommissioning of the offshore wind farm, thus potentially providing a positive impact well beyond the 35-year consent period, and providing further confidence that sufficient compensation can be delivered for the potential impacts incurred during the operational lifetime.

Monitoring

4.2.3.14 Monitoring of the site and colony pre- and post-implementation is essential to confirm the complete removal as well as the implementation of biosecurity to remove the risk of incursion.

4.2.3.15 Monitoring of population size and productivity, alongside the monitoring of any other relevant environmental variables, can be used to infer success of this compensation measure.

Adaptive Management

4.2.3.16 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective.

4.2.3.17 Examples of appropriate adaptive management for mammalian predator control could include i) expanding mammalian control to other locations, ii) monitoring fences to identify potential damage to restore, iii) improving fence design e.g., addition of overhangs, buried barriers or electric fencing and/ or iiii) increased biosecurity measures.

Feasibility

Technical Feasibility

4.2.3.18 This measure could be delivered by the project alone, or through supporting a planned or existing initiative. There is considerable precedent for carrying out invasive species management, such as rodent eradication and large mammal exclusion. There is a wealth of knowledge on appropriate techniques and technical kit (e.g., traps and fences), with detailed "best practice" guidance, such as the UK Rodent Eradication Best Practice Toolkit Thomas, 2017[41]) available. Specialist teams can also be called upon to advise and assist in any predator management programmes. Predator management is thus considered a highly feasible measure from a technical perspective.

4.2.3.19 Based on qualitative assessment using expert judgement, and the successful implementation of measures for mammalian predator management and eradication at various seabird breeding sites in the UK, it is deemed technically feasible to implement this proposed measure for this project, with a high likelihood of success if implemented at appropriate sites.

Financial Feasibility

4.2.3.20 The cost of this measure is highly dependent on the location and scale of the control methods and their success. It is likely to have a significant financial cost due to the cost of full eradication, biosecurity and the- level of monitoring required pre- and post-implementation. It would be less costly to fund an existing (or planned) eradication programme compared to developing an eradication programme from scratch.

Legal Feasibility

4.2.3.21 Existing guidance, such as the UK Rodent Eradication Best Practice Toolkit (Thomas, 2017[41]), and specialist eradication teams can be used to ensure all relevant legislation is adhered to. Licences would be required for the implementation of control measures, and landowner agreement would be needed.

4.2.3.22 The potential for a negative public perception around this measure, dependent on the control measure and target species, should be considered.

4.2.4 Non-lethal Avian Predator Control

4.2.4.1 Avian predation of seabird eggs, chicks or adults is widespread, with key UK avian predator species including great black-backed gull (*Larus marinus*), hooded crow (*Corvus cornix*) and great skua (Lopez *et al.*, 2023[42]; Johnston *et al.*, 2019[43]; Votier *et al.*, 2004[44]).

4.2.4.2 In addition to predation, other bird species can affect seabirds through kleptoparasitism, involving the stealing of food from other birds, as frequently observed to occur by great skua and great black-backed gull (Garthe and Hüppop, 1998[45]). This can reduce food availability for the affected species, with potential impacts on survival and productivity.

4.2.4.3 The proposed measure would involve the non-lethal exclusion of avian predators from a buffer zone around a breeding colony to reduce breeding failure due to predation.

4.2.4.4 The management of avian predators could be achieved through scaring techniques, including the use of scarecrows, human disturbance (e.g., wardens), distress callers (which play distress calls of the avian predator) and auditory deterrents such as humming lines and scarer ropes (Morrison and Allcorn, 2006[46]).

Ecological Evidence

4.2.4.5 There is evidence of great skua predation affecting adult survival rates, and being associated with colony declines in the Northern Isles (Anderson, 1976[47]; Votier *et al.*, 2008[48]), although it is possible any such effects may be most prominent in the Northern Isles and possibly other parts of north and north-west Scotland. A negative relationship between kittiwake breeding success and the number of Great skua in proximity (up to 25km) to kittiwake colonies (Votier *et al.*, 2007[49]). It should however be noted that and great skua HPAI mortality might have reduced predation impacts on seabirds in recent years, and that any measures deterring great skua are likely infeasible given the species' current population declines.

4.2.4.6 Larger gull species may also predate kittiwake eggs and chicks (as recorded at the Farne Islands and Ailsa Craig), and great skuas and peregrine falcons have been recorded predating large chicks or fledglings at a small number of colonies (Furness *et al.*, 2013[31]). Great black-backed gull predation has been cited as a cause of low productivity at UK sites (Mavor *et al.*, 2008[105]).

4.2.4.7 There is evidence showing that non-lethal avian predator control can be successful for some seabird colonies (Babcock and Booth, 2020[50]). Management techniques such as scarecrows, human disturbance (e.g., wardens), distress callers, humming lines and scarer ropes have been shown to have varying degrees of success when deployed on Coquet Island, however a range of methods deployed over the breeding season would be most appropriate to reduce gull habitation to these techniques (Morrison and Allcorn, 2006[46]).

4.2.4.8 Overall, this measure has the potential to reduce predation, with a subsequent positive effect on kittiwake productivity and survival rate.

Wider Ecological Considerations

4.2.4.9 Large gull species are declining across the UK, while great skua is increasing in population size (Burnell *et al.*, 2023[51]). However great skua to vulnerable to both climate change and the Highly Pathogenic Avian Influenza (Burthe *et al.*, 2014[52]; Tremlett *et al.*, 2024[53]). Therefore, predator control may compromise sites conservation objectives of sites these species as designated features. Furthermore, there is still risk of negatively impacting other birds at the site with the implementation of scaring techniques that involve acoustics. Careful consideration of this measure, with the wider ecological context weighed up against benefits for kittiwake, is needed, to ensure this compensation measure is a suitable option from a holistic conservation perspective. Careful site selection will be key in ensuring that this measure, if deployed, is optimally implemented to minimise negative side-effects on other species.

4.2.4.10 However, positive wider ecological benefits of avian predator control include benefits to other seabird species impacted by avian predation.

Timing of Delivery

4.2.4.11 As outlined in the feasibility sections below, there are existing, well-evidenced avian predator control measures, and the measures (e.g., visual and auditory deterrents) are straightforward to acquire and implement from both a technical and legal perspective, although additional time (weeks to months) may be needed for kittiwake for further technical development time (e.g., expert consultation/research) to select appropriate methods which deter large gulls but do not cause a deterrent effect in kittiwake. The measure can then be readily implemented as soon as site selection and any partnership agreements/contracts have been secured – there is thus little technical lead-in time anticipated. It should be acknowledged that this measure targets an increase in seabird productivity (i.e., numbers of chick fledged per pair). There is thus an inevitable ecological time delay between implementing the measure and additional fledged birds reaching breeding age. For kittiwake it takes four years for any fledged juvenile to reach breeding age (Horswill and Robinson, 2015[12]). Whilst, as outlined above, there is little technical lead-in time for this measure to become effective, implementation is therefore recommended prior to operation to minimise or avoid a build-up of temporary compensation debt of adult birds (whilst awaiting birds to reach adulthood) during the early years of implementation.

Monitoring

4.2.4.12 Monitoring of the site and colony pre- and post- implementation is essential to confirm that there is a reduction of disturbance and predation.

Adaptive Management

4.2.4.13 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective.

4.2.4.14 Examples of appropriate adaptive management for the non-lethal exclusion of avian predators could include i) extending the measure through the use of additional scaring techniques, such as scarecrows, wardens, or auditory deterrents ii) expanding the exclusion zone to cover a larger buffer area or additional breeding colonies where predation by species are common, and/or iii) adjusting the duration of exclusion efforts based on predator activity during the seabird breeding season to enhance protection.

Feasibility

Technical Feasibility

4.2.4.15 A number of non-lethal avian predator control measures have been successfully implemented (e.g., Morrison and Allcorn, 2006[46]). This measure is thus feasible from a technical perspective.

4.2.4.16 Site selection work is needed to identify which colonies may suffer have avian predation issues, and effective methods of control will need to be evaluated and designed (either before or during the implementation of this measure). In particular, technical feasibility for this measure for kittiwake needs to carefully consider the potential for smaller gull species such as kittiwake to respond any deterrents implemented for large gull predators. Any measures which affect kittiwake also, would make this measure infeasible for kittiwake.

4.2.4.17 Based on qualitative assessment using expert judgement, and past successful implementation of non-lethal avian predator control measures, it is deemed technically feasible to implement this proposed measure for this project, with a high likelihood of success if implemented at appropriate sites.

Financial Feasibility

4.2.4.18 The cost of this measure would be dependent on the location, scale of control, and method used, but is generally considered feasible by the Applicant.

Legal Feasibility

4.2.4.19 Landowner agreement and any relevant licensing would need to be secured in advance of implementing this measure.

4.2.4.20 Potential negative public perception of this measure would need to be considered.

4.3 Gannet

4.3.1 Overview

4.3.1.1 Discussed below is the short list of potential measures deemed suitable to be taken forward for next steps for compensation development for gannet:

- Reduction of disturbance at colony;
- Bycatch mitigation; and
- Mammalian predator management and eradication.

4.3.2 Reduction of Disturbance at Colony

Introduction

4.3.2.1 Anthropogenic disturbance is caused by the presence of external stimuli (such as people, pets and vehicles) within close proximity to colonies, resulting in temporary flushing or permanent abandonment of nesting sites, as well as reducing time for the acquisition of resources and allowing nests to be targeted by predators (Carney and Sydeman, 1999[4]; Buckley, 2004[5]; Frederiksen, 2010[6]).

4.3.2.2 Reduction measures that can be implemented include the introduction of wardens, signage, path diversions and path maintenance (Allbrook and Quinn, 2020[7]). The overarching aim of these disturbance reduction measures is to increase productivity by reducing both direct mortality effects (e.g., increased egg/chick predation) and long-term impacts on physiological stress caused by human disturbance on nesting seabirds.

Ecological Evidence

4.3.2.3 Disturbance is known to be a major threat to seabirds (Dias *et al.,* 2019[88]). Gannet are likely to abandon their nests in areas of high disturbance (Stearns, 1992[54]), which could lead to a decrease of breeding success. A recent case study suggested 40 chick deaths per annum may be prevented by preventing visitors from walking between gannet nests to a viewing platform at Bass Rock (DTA, 2020[55]). Furthermore, breeding gannet at the Great Saltee colony in Ireland were disturbed by visitors to the island, with group size, the total number of visitors and the proximity of approach all having an impact on the level of disturbance to the breeding birds (Allbrook and Quinn, 2020[7]).

4.3.2.4 There is evidence to suggest that breeding gannets are impacted by human disturbance and as such could benefit from the implementation of management at colonies where it can be shown that this is an issue. There are a range of disturbance reduction measures that can be implemented at

seabird colonies including wardens, signage, path diversions and path maintenance (Allbrook and Quinn, 2020[7]).

Wider Ecological Considerations

4.3.2.5 As disturbance is known to be a major threat to a range of seabird species (Dias *et al.,* 2019[88]), disturbance-reducing measures are also likely to benefit species other than gannet.

4.3.2.6 The potential negative consequences of disturbance reduction should also be considered. For example, disturbance-reducing measure may also reduce disturbance of predator species such as herring gull, meaning they could increase in number and thus increase predation. Thus, the presence of nearby colonies of avian predators and their potential response to disturbance-reduction measures should be considered.

Timing of Delivery

4.3.2.7 As outlined in the feasibility sections below, there are existing, well-evidenced disturbance-reducing measures for seabirds, and the measures (e.g., closures, diversions, signage, warden employment) are straightforward to implement from both a technical and legal perspective. The measure can therefore be readily implemented as soon as site selection and any partnership agreements/contracts have been secured – there is thus no technical lead-in time (i.e., the measure will start delivering benefits immediately upon its implementation). It should be acknowledged that this measure targets an increase in seabird productivity (i.e., numbers of chick fledged per pair). There is thus an inevitable ecological time delay between implementing the measure and additional fledged birds reaching breeding age. For gannet it takes five years for any fledged juvenile to reach breeding age (Horswill and Robinson, 2015[12]). Whilst, as outlined above, there is no technical lead-in time for this measure to become effective, implementation is therefore recommended prior to operation to minimise or avoid a build-up of temporary compensation debt of adult birds (whilst awaiting birds to reach adulthood) during the early years of implementation. It should also be noted that disturbance-reducing measures, once implemented and if maintained, could deliver ongoing benefits after the decommissioning of the offshore wind farm, thus potentially providing a positive impact beyond the 35-year consent period, and providing further confidence that sufficient compensation can be delivered for the potential impacts incurred during the operational lifetime.

Monitoring

4.3.2.8 In order to successfully monitor and quantify this measure, baseline surveys as well as post implementation surveys of the measure would need to be undertaken to identify the levels of anthropogenic disturbance.

4.3.2.9 The success of the measure in reducing for example footfall, and potentially disturbance events (e.g., flushing) can be measured and monitored quantitatively. Attributing a growth in adult breeding population, or an improvement in productivity, to the disturbance reducing measure is considered to be challenging due to the indirect nature of this measure. Monitoring of the success of the measure would therefore require a combination of quantitative and qualitative evidence. Annual counts and productivity measurements would be made at the candidate site(s) following their identification, with monitoring continuing following the implementation of measures.

Adaptive Management

4.3.2.10 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective.

4.3.2.11 Examples of appropriate adaptive management adjustments for the disturbance reduction measure would include i) extending the measure through the implementation of additional signage, path diversions, wardens etc., ii) expanding the measure to cover a larger area and/or additional sites, iii) extending the duration of disturbance reduction measures.

Feasibility

Technical Feasibility

4.3.2.12 There are several reduction measures, already developed and tested, that can be implemented at seabird colonies, including wardens, signage, path diversions and path maintenance. Allbrook and Quinn (2020[7]) installed signage at the breeding colony which informed visitors of the potential disturbance to the breeding gannets. It was shown that most visitors followed the guidance provided on the signs, with 74% of visitors staying a minimum of 5m from the birds. The small number of visitors (11 individuals) who ignored the signs caused 84% of the disturbance events reported during the study, some of which led to the predation of gannet chicks by gulls (Allbrook and Quinn, 2020[7]).

4.3.2.13 There is further evidence of effectiveness of disturbance-reduction measures at breeding bird colonies. Lynch *et al.* (2017[13]) showed wardens; fencing and signage were effective in reducing disturbance of little tern. Dowling and Weston (1999[1414]) showed fencing, signage, temporary beach closures and wardens helped reduce disturbance of hooded plover. Similarly, signs, fencing and wardens have also been shown to be an effective measure in reducing anthropogenic disturbance of breeding shorebirds (Weston *et al*., 2012[15]). Buxton *et al*. (2017[16]) proposed the use

of signs to implement 'quiet zones' to reduce the effects of visitor noise on nesting Brandt's cormorants, following evidence of the effectiveness of signs reported by Stack *et al*. (2011[17]). Set-back distances or buffer zones have been also applied to reduce the disturbance of wetland birds (Rodgers and Smith, 1997[18]; Rodgers and Schwikert, 2002[19]) and nesting seabirds (e.g., Pfeiffer and Peter, 2004[20]). Lafferty *et al*. (2006[21]) also reported on the effectiveness of rope fencing, signs and volunteers protecting nesting snowy plover.

4.3.2.14 Further research (through literature review and consultation of local experts or stakeholders) would be needed to identify if and at which SPAs/colonies human disturbance is impacting gannet populations and to identify suitable colonies where (additional) disturbance-reducing measures would be beneficial (see sections 5 and 6).

4.3.2.15 Measures could be implemented collaboratively between the Applicant and site managers and/or landowners, or strategic funding can be provided to sites where disturbance is an impact at a site and where management plans are in place but have limited funding or resources to implement successful measures, and the monitoring required to investigate the success (or otherwise) of the measure(s).

4.3.2.16 Based on qualitative assessment using expert judgement, and the successful implementation of reduction of disturbance measures at breeding colonies for gannet, it is deemed technically feasible to implement this proposed measure for this project, with a high likelihood of success if implemented at appropriate sites.

Financial Feasibility

4.3.2.17 This measure is considered financially feasible; the full financial cost of the measure will depend on the type of site management taken forward. The measure could be funded either through funding of wardens at the site or through the funding of contractors and other associated costs to design and install measures (e.g., signage and fencing).

Legal Feasibility

4.3.2.18 This measure is likely straightforward from a legal perspective. Prior to consent, liaison with site managers and/or landowners would be required to reach agreements. Land rights are not anticipated to be required.

4.3.3 Bycatch Mitigation

Introduction

4.3.3.1 Seabird bycatch from commercial fishing activity is considered to be a global concern (Žydelis *et al.*, 2013[56]; Anderson *et al.*, 2011[57]; Miles *et al.*, 2020[58]) with approximately 100 species impacted worldwide (Dias *et al.*, 2019[88]). Hundreds of thousands of seabird mortalities are estimated

annually worldwide within gillnets (400,000; Žydelis *et al.*, 2013[5656]) and longline fisheries (320,000; Anderson *et al.*,2011[5757]). According to a recent review undertaken by Ramírez *et al.* (2024[59]) an average of 195,000 seabirds are by-caught in European waters per year (ranging between 130,000 to 380,000 seabird). As such, bycatch is considered one of the top three threats to global seabird populations (Dias *et al.*, 2019[8]).

4.3.3.2 The Scottish Government commissioned a review into bycatch in Scottish longline fisheries (Kingston *et al.*, 2023[60]). For gannet, it was estimated that 50 to 150 birds are bycaught annually by UK offshore longline fisheries in the area from the Celtic Sea to the northern North Sea (with most fleet effort found north of Scotland). The report recommended further baseline monitoring and trialling of bycatch reduction techniques in collaboration with industry.

4.3.3.3 This compensation measure involves the trialling and/or implementation of bycatch reduction techniques (e.g., bird scaring lines, line weighting) to reduce seabird bycatch with the aim of increasing survival and population size.

Ecological Evidence

4.3.3.4 Bradbury *et al.* (2017[61]) identified gannet to be within the top 10 (out of 53) species vulnerable to bycatch by surface, pelagic and benthic fishing gears. Gannet are plunge divers, diving from heights of up to 30m to depths of up to 20m (JNCC 2021[62]; Wildlife Trust 2021[63]; Garthe *et al.*, 2007[64]) to feed on high-energy prey (e.g., Sandeels, *Ammodytes sp*) (Hamer *et al.*, 2007[65]). Individuals are thus unlikely to notice certain fishing gears before their dive. Gannet also often feed on fisheries discards and therefore are attracted to active fishing vessels (JNCC, 2021[62]) which increases their risk of being bycaught.

4.3.3.5 Hundreds of gannets are estimated to be bycaught each year within UK fisheries; according to Northridge *et al.* (2020[66]) this species is most vulnerable to longline fishing, with 220 birds bycaught during 2016 and a further 241 birds the following year (2017). Gannet were also recorded in coastal static nets albeit on a smaller scale, with 117 birds bycaught in 2016 and 102 birds in 2017 (Northridge *et al.*, 2020[66]). Bycatch can occur year-round (with an increase in juveniles taken in the summer) and coincides with the main wintering areas for the UK breeding population. Ramírez *et al.* (2024[59]) estimates approximately 18,525 gannet are by-caught within the Northeast Atlantic per year.

4.3.3.6 Long-line fishery effort is concentrated within Scottish waters, within the International Council for the Exploration of the Seas (ICES) divisions IVa (4.a.) and VIa (6.a.) specifically, with 130 birds bycaught during 2016 and 159 birds during 2017 (Northridge *et al.*, 2020[66]). It should be noted the overall coverage of long-line fisheries by the UK Bycatch Monitoring Programme (BMP) is relatively low, as sampling only started in 2010 and

the coverage of smaller inshore long-line fisheries have not been fully assessed due to low sampling size (Northridge *et al.*, 2023[67]).

4.3.3.7 Similar findings were presented in Bradbury *et al.* (2017[61]) with longline fisheries effort concentrated in Scottish waters, along the shelf break north and west of Scotland during the summer and winter.

4.3.3.8 A further three ICES divisions (VIIb (7.b.), VIIc (7.c.) and VIIj (7.j.)), located off the west and southwest coast of Ireland, were deemed to be important areas for gannet longline bycatch with 91 birds bycaught in 2016 and a further 80 birds in 2017 (Northridge *et al.*, 2020[66]).

4.3.3.9 Given the scale of the bycatch issue faced by gannet, as outlined above, the implementation of bycatch reduction measures would thus be a highly effective compensation measure from an ecological feasibility perspective.

Wider Ecological Considerations

4.3.3.10 As per Northridge *et al.* (2020[66]) guillemot, gannet, gull species, and razorbill would all benefit from bycatch reduction measures, with UK annual bycatch estimates of approximately 50 kittiwake, 4,000 guillemot, 600 gannet and 260 razorbill.

4.3.3.11 According to Miles *et al.* (2020[58]) bycatch mortality accounts for more than 1% of the total annual adult mortality for seven of the ten seabird species studied, including guillemot and gannet. It was also noted that many UK seabird species lack bycatch estimates because they have not been recorded by the UK BMP. Some species, such as divers (excluding great northern diver *Gavia immer*), black guillemot (*Cepphus grylle*), and various shearwaters, have been shown to have high bycatch rates in other countries, raising questions about whether UK bycatch for these species is under-recorded, unsampled, or genuinely low. Furthermore, modelled impacts found that great cormorant (*Phalacrocorax carbo*), great northern diver and northern fulmar (*Fulmarus glacialis*) showed an estimated population increase of more than 1% over 25 years when bycatch mortality was removed (Miles *et al.*, 2020[58]).

4.3.3.12 Given the evidence presented above it is feasible that the implementation of a bycatch mitigation measure could, in time, deliver benefits for the wider national site network/Natura 2000 network and for a wide range of seabirds, as well as potentially marine mammals.

Timing of Delivery

4.3.3.13 It is anticipated that a minimum of one to two years are needed to further engage with the fishing industry and plan the implementation of monitoring and/or trials. Once at-sea trials are implemented, compensation gains are immediate as this measure would prevent bycatch of adult birds (as well as juveniles), thus directly benefiting the adult breeding population.

Monitoring

4.3.3.14 Given the sporadic nature of bycatch events, extensive on-board monitoring on multiple vessels across multiple areas is likely required. This could involve either human observers, or remotely collected data. Monitoring methods are well established thus highly feasible, albeit relatively costly.

Adaptive Management

4.3.3.15 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective.

4.3.3.16 Examples of appropriate adaptive management for seabird bycatch reduction could include i) trialling alternative techniques to test their implementation capabilities, ii) applying successful bycatch reduction technologies to other locations or fisheries, and/or iii) expanding the use of bycatch reduction technologies to more vessels within the fishery.

Feasibility

Technical Feasibility

Bycatch Monitoring

4.3.3.17 On-board observer monitoring coverage is low relative to the scale of commercial fishing, therefore bycatch monitoring and reporting is limited (Pott and Wiedenfeld, 2017[68]). Total bycatch mortality estimates are often derived from incidental recordings of bycatch, additionally only a small proportion of monitoring programmes are focused on bycatch monitoring, as such long-term datasets are often limited and/or unavailable (ICES, 2022[69]).

4.3.3.18 Northridge *et al.* (2020[66]) and Miles *et al.* (2020[58]) undertook an analysis of the BMP data which has identified areas of concern around the UK and contributed to closing knowledge gaps. Within the UK, static net (set gillnet) fisheries were deemed an important fishery with regards to guillemot, razorbill and gannet bycatch, and longline fisheries as an important fishery with regards to gannet bycatch. However, the coverage of the UK BMP is limited, with <1% of static net, 1-2% of longline, and roughly 5% of midwater trawl fishing effort being monitored.

4.3.3.19 There is an existing UK research base with established methods for monitoring bycatch. Monitoring of bycatch, through electronic monitoring or on-board observers, would be thus a technically feasible way to further close knowledge gaps on gannet bycatch (in combination with mitigation trials where feasible), thus working towards solutions to reduce bycatch.

Bycatch Mitigation Trials

4.3.3.20 A review was undertaken by the JNCC, on behalf of Defra, of the current seabird bycatch reduction techniques implemented in fisheries worldwide that are likely to be effective in reducing seabird bycatch by UK fleets (Anderson *et al.*, 2022[70]). According to Anderson *et al.* (2022[70]), several effective seabird bycatch reduction techniques for demersal long-line fisheries could be applied to UK fleets. Namely, line weighting, which increases the sink rate of baited hooks to reduce time available for surface foraging seabirds to encounter the hook; bird scaring or tori lines, which act as visual and physical barriers to deter birds from the area where baited hooks are deployed; and Bird Exclusion Devices (BED), which consist of horizontal supports and vertical streamers to prevent birds from getting hooked during gear hauling. Tori lines are noted to be particularly successful on some UK-registered vessels. Anderson *et al.* (2022[70]) emphasize that these measures should be used in combination with others, such as night-setting, for maximum effectiveness, although increased risks of bycatch of other species due to night setting would need to be considered (Melvin *et al.*, 2019[71]).

4.3.3.21 The Hornsea Project Four Offshore Wind Farm (hereafter 'Hornsea Four') submitted a review of long-line bycatch reduction techniques with Examination (G1.42 Compensation measures for FFC SPA: Gannet Bycatch Reduction: Ecological Evidence; Ørsted, 2022[72]). A review of relevant literature and data was undertaken to provide an update of available evidence of gannet bycatch in long-line and midwater trawl fisheries, as well as a short list of potential bycatch reduction measures applicable to these gears. The shortlisted measures for long-line fisheries included lumo leads (line weighting), side setting with bird scaring lines, and hook shielding (e.g., Hookpod and Smart Tuna Hook). For mid-water trawls, tori-lines and cones were shortlisted. Among these, hook shielding, specifically Hookpods, was identified as the most promising measure.

4.3.3.22 There is thus existing bycatch reduction technology available that could be implemented and/or trialled as compensation for gannet, showing there is technical feasibility for this measure, although the technology is likely to need further research and refinement (which could be carried out as part of the compensation delivery). Further detail of bycatch reduction technology techniques are set out below.

Line Weighting

4.3.3.23 Baited hooks pose the highest risk of seabird bycatch from deployment until they sink below seabird diving depths (20 meters for gannets). Line weighting reduces this risk by increasing the sink rate of baited hooks, thus limiting the time seabirds have to encounter them. Experimental studies have shown line weighting to be effective in increasing sink times and reducing seabird bycatch (e.g., Melvin *et al.*, 2014[73], 2023[74]). Boggs (2001[75]) reported line weighting reduced interactions between Black footed

Albatross (*Phoebastria nigripes*) and Laysan Albatross (*P. immutabilis*) and baited hooks by approximately 90%, when implemented with dyed bait. As per Melvin *et al.* (2013[76]) seabird bycatch was 18 times greater on unweighted lines compared to weighted lines, with no notable impact on fish catch, within a longline fishery targeting tuna in the South African Exclusive Economic Zone (EEZ). It should be noted these studies recommended line-weighting be implemented with other bycatch reduction techniques including bird scaring lines and setting lines at night. Impacts of night-setting on bycatch rates of other species would need to be carefully considered, as it has been suggested bycatch of certain species can increase (Melvin *et al.*, 2019[71]).

4.3.3.24 Line weighting is recommended as best practice by the Agreement for Conservation of Albatrosses and Petrels (ACAP) (CleanCatchUK, 2021[77]). However, line weighting poses safety risks, such as 'flybacks' where broken weighted lines can fly back towards the vessel. Sliding weights and innovations like FishTek Marine's Lumo lead help mitigate these risks. Additionally, ACAP has developed guidelines to minimize fly-back risk (ACAP, 2019[78]).

Bird Scaring Lines

4.3.3.25 There is evidence of the effectiveness of the addition of bird scaring lines (or tori lines) to the stern of vessels, with coloured streamers attached, in reducing seabird bycatch. The lines and streamers act as a visual and physical barrier by moving in the wind and deterring individuals from entering the area where the baited hooks are deployed, and the bright colours distract the birds (Parker, 2017[79]; AFMA, 2015[80]). Bird scaring lines are reported to be successful in excluding birds from lines on the 8 out of 15 UK-registered demersal long-line vessels that reportedly use this bycatch reduction technique (M. Hermida, Hooktone, pers. obs.). There is widespread evidence of the success of this measure in reducing seabird bycatch (Da Rocha *et al.*, 2021[81]; Løkkeborg and Robertson, 2002[82]; Løkkeborg, 2011[83]; Melvin *et al.*, 2014[73]; Domingo *et al*., 2017[84]).

4.3.3.26 Other bird exclusion devices, similar to bird scaring lines, include streamers suspended from a pole or a small boom placed fore and aft of the hauling station. These simple devices have been implemented in both demersal and pelagic longline fisheries to minimize seabird captures while hauling hook- lines and branch- lines (Reid *et al.*, 2010[85]).

4.3.3.27 The use of BED, which consist of vertical streamers and a horizontal support several metres above the water that encircles the entire line hauling bay is another example of bird scaring lines. Anderson *et al.* (2022[70]) noted that this method should be implemented along with other bycatch reduction measures like line weighting, bird scaring lines and night-setting, although increased risks of bycatch of other species due to night setting would need to be considered (Melvin *et al.*, 2019[71]).

Additional Measures

4.3.3.28 There is evidence to suggest hook shielding is an effective bycatch reduction technique. Hook shielding guards the barb of the hook, making the hook inaccessible to seabirds. The shield around the hook will then retract after a set time or at a set depth (e.g., >20m for gannet). There are two developed technologies which use hook shielding namely, Hookpod and Smart Tuna Hook, both of which are widely accepted techniques, the former has reduced bycatch by ~95% according to Sullivan *et al.* in Barrington (2016[86]) and the former by 81.8% to 91.4% (CleanCatch UK, 2021[77]).

4.3.3.29 Moreover, longlines can be set at night to reduce seabird bycatch, however the risk of bycatch to other species (e.g., fulmar) could increase (Melvin *et al.*, 2019[71]), and there is only limited understanding of effect on target catch and other protected species.

Industry Relationships

4.3.3.30 A further key feasibility consideration for bycatch mitigation work is the need for strong working relationships with the fishing industry and relevant regulators. When looking to implement monitoring or trials, close partnerships with skippers are needed to address any concerns around the impacts of the proposed programme on for example hauls, physical space on the vessel, workloads and health and safety of crew members (Kingston *et al.,* 2023[60]).

4.3.3.31 The Applicant is carrying out a pilot study in collaboration with fishing vessels, with data collected in the greater Moray Firth area between April and October 2024 to assess the feasibility of data collection on bycatch in the area, as well as to collect information on the types of interaction observed between vessels and seabird species. Vessels using a range of methods (e.g., static, scallops, trawl/nephrops) have been included within the pilot study. The findings of the study will be used to assist in the planning of extended monitoring in future years. The Applicant is thus well placed to undertake collaborative work with the fishing industry due to its longstanding relationships with the industry in the Moray Firth region.

Conclusion

4.3.3.32 Based on the existing research base and available guidelines on monitoring, and available technologies for monitoring and bycatch reduction, this measure is deemed highly feasible to implement. Technology refinements and further research is likely needed as part of the implementation of this measure, which will aid in filling knowledge gaps in order to reduce seabird bycatch and thereby benefit their populations.

Financial Feasibility

4.3.3.33 Given the sporadic nature of bycatch events, extensive on-board monitoring on many vessels across multiple areas are likely required. This measure is likely to have a significant financial cost due to the intensive, widespread monitoring required. This measure may thus be best suited as either an industry-level or strategic measure delivered in conjunction with other developers, but could be developed by the project alone should this collaborative compensation not be possible.

Legal Feasibility

4.3.3.34 Researching, monitoring and trialling bycatch technology is unlikely to have any legal constraints. Implementation of these measure would require active engagement with fisheries and fisheries stakeholders.

4.3.4 Mammalian Predator Management and Eradication

4.3.4.1 Predation by invasive non-native mammals is considered a key threat to breeding seabird island colonies (Brooke *et al.*, 2018[22];). Mammals such as brown and black rats, feral cats and Mustelidae such as American mink are all known to predate seabird eggs, chicks and adults (Latorre *et al.*, 2013[23], Craik, 1997[24], Ratcliffe *et al.*, 2010[25]).

4.3.4.2 This compensation measure would involve lethal or non-lethal predator control measures at a breeding colony. The overarching aim of predator control measures is to reduce direct mortality effects of mammalian predation on nesting seabirds (i.e., predation on eggs and chicks) and as such increase productivity and the population size. Lethal control involves the use of rodenticide or other poison bait, placed within bait boxes (Zonfrillo, 2001[26]). Non-lethal control, such as the use of exclusion fencing can also be appropriate for certain sites and predators (Dalrymple, 2023[27]). It should be noted predator eradication programmes tend to be most effective on islands, however predator exclusion measures, such as exclusion fencing, are often considered suitable for deployment at mainland colonies.

Ecological Evidence

4.3.4.3 Recent reviews of potential compensation measures provide little evidence that mammalian predation is a problem at UK gannet colonies (Furness *et al.*, 2013[31]; Furness, 2021[29]; McGregor *et al.*, 2022[87]). However, an earlier review undertaken by Coulson (2002[88]) reported that rats have been observed predating on gannet eggs and chick.

4.3.4.4 However, it should be noted the beneficial effects of this compensatory measure are restricted to specific situations, depending on accessibility of nest sites and mammalian predation pressure at specific breeding colonies, or sub-sites within them.

4.3.4.5 To ensure effectiveness is maintained upon completion of eradication or exclusion, biosecurity measures would be implemented alongside mammalian predator management and/or eradication to secure benefits obtained from the eradication programme(s). These would require to be implemented for the duration of the operational phase of the Proposed Development (Offshore).

Wider Ecological Considerations

4.3.4.6 Population declines of various bird species have been attributed to predation by mammals (Doherty *et al.*, 2016[89]). Within the UK and Ireland, there is evidence to suggest red foxes (*Vulpes vulpes*) predate on gull chicks, eggs, and adults (Mavor *et al.*, 2001[90]). Davis *et al.* (2018[91]) indicated that herring gull productivity significantly decreased as fox sightings increased, and that predator fencing appeared to be effective in increasing herring gull breeding productivity.

4.3.4.7 Brown and black rats were eradicated from Lundy Island in the Bristol Channel between 2002 to 2004 as part of a project to improve conditions on the island for puffin and European storm petrel (*Hydrobates pelagicus*). Following the removal of the rats from the island guillemot and razorbill populations increased by 321% and 272%, respectively, between 2000 (before eradication) and 2021 (after the island was declared rat free) (Ørsted, 2021b[92]). Populations of guillemot and razorbill at neighbouring colonies, namely Skomer and Castlemartin Coast, also saw a percentage increase of 79% and 94% (guillemot) and 93% and 32% (razorbill) between 2000 to 2017, respectively (Ørsted, 2021b[35]).

4.3.4.8 There is also increasing evidence of the effectiveness of removal or control of mammalian predators to increase breeding success and adult survival at seabird colonies around the world including islands around New Zealand (Towns and Broome, 2003[93]; Rayner *et al.*, 2007[94]).

4.3.4.9 Further examples from various seabird breeding colonies include Cooper *et al.* (1995[95]); Keitt and Tershy (2003[96]); Williams, Byrd and Konyukhov (2003[97]) and Brooke *et al* (2018[22]).Given the evidence presented above it is feasible that the implementation of a predator control/eradication measure can, in time, deliver substantial benefits for the wider national site network/Natura 2000 network and for a wider range of seabirds.

Timing of Delivery

4.3.4.10 As outlined in the feasibility sections below, there is extensive technical and legal precedent for mammalian predator eradication across the UK. The measure can therefore be readily implemented, using current guidelines and best practice, as soon as site selection, legal permissions and contracts have been secured. It should be acknowledged that this measure targets an increase in seabird productivity (i.e., numbers of chick

fledged per pair). There is thus an inevitable ecological time delay between implementing the measure and additional fledged birds reaching breeding age. For gannet, it takes five years for any fledged juvenile to reach breeding age (Horswill and Robinson, 2015[12]), before the implemented measure begins to compensate for the predicted impacts. Whilst, as outlined above, there is no technical lead-in time for this measure to become effective, implementation is therefore recommended prior to operation to minimise or avoid a build-up of temporary compensation debt of adult birds (whilst awaiting birds to reach adulthood) during the early years of implementation. It should also be noted that eradication and control measures, once implemented and if maintained with biosecurity, could deliver ongoing benefits long after the decommissioning of the offshore wind farm, thus potentially providing a positive impact well beyond the 35-year consent period, and providing further confidence that sufficient compensation can be delivered for the potential impacts incurred during the operational lifetime.

Monitoring

4.3.4.11 Monitoring of the site and colony pre- and post-implementation is essential to confirm the complete removal as well as the implementation of biosecurity procedures to remove the risk of incursion.

4.3.4.12 Monitoring of population size and productivity, alongside the monitoring of any other relevant environmental variables, can be used to infer success of this compensation measure.

Adaptive Management

4.3.4.13 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective.

4.3.4.14 Examples of appropriate adaptive management for mammalian predator control could include i) expanding mammalian control to other locations, ii) monitoring fences to identify potential damage to restore, iii) improving fence design (e.g., addition of overhangs, buried barriers or electric fencing) and/or iiii) increased biosecurity measures.

Feasibility

Technical Feasibility

4.3.4.15 This measure could be delivered by the project alone, or through supporting a planned or existing initiative. There is considerable precedent for carrying out invasive species management, such as rodent eradication and large mammal exclusion. There is a wealth of knowledge on

appropriate techniques and technical kit (e.g., traps and fences), with detailed "best practice" guidance, such as the UK Rodent Eradication Best Practice Toolkit Thomas, 2017[98]) available. Specialist teams can also be called upon to advise and assist in any predator management programmes. Predator management is thus considered a highly feasible measure from a technical perspective.

4.3.4.16 Based on qualitative assessment using expert judgement, and the successful implementation of measures for mammalian predator management and eradication at various seabird breeding sites in the UK, it is deemed technically feasible to implement this proposed measure for this project, with a high likelihood of success if implemented at appropriate sites.

Financial Feasibility

4.3.4.17 The cost of this measure is highly dependent on the location and scale of the control methods and their success. It is likely to have a significant financial cost due to the cost of full eradication, biosecurity and the- level of monitoring required pre- and post-implementation. It would be less costly to fund an existing (or planned) eradication programme compared to developing an eradication programme from scratch.

Legal Feasibility

4.3.4.18 Existing guidance, such as the UK Rodent Eradication Best Practice Toolkit (Thomas, 2017[41]), and specialist eradication teams can be used to ensure all relevant legislation is adhered to. Licences would be required for the implementation of control measures, and landowner agreement would be needed.

4.3.4.19 The potential for a negative public perception around this measure, dependent on the control measure and target species, should be considered.

4.4 Guillemot

4.4.1 Overview

4.4.1.1 Discussed below is the short list of potential measures deemed suitable to be taken forward for next steps for compensation development for guillemot:

- Reduction of disturbance at colonies;
- Mammalian predator management and eradication;
- Non-lethal avian predator control; and
- Bycatch mitigation.

4.4.2 Reduction of Disturbance at Colonies

Introduction

4.4.2.1 Anthropogenic disturbance is caused by the presence of external stimuli (such as people, pets and vehicles) within close proximity to colonies, resulting in temporary flushing or permanent abandonment of nesting sites, as well as reducing time for the acquisition of resources and allowing nests to be targeted by predators (Carney and Sydeman, 1999[4]; Buckley, 2004[5]; Frederiksen, 2010[6]).

4.4.2.2 Reduction measures that can be implemented include the introduction of wardens, signage, path diversions and path maintenance (Allbrook and Quinn, 2020[7]). The overarching aim of these disturbance reduction measures is to increase productivity by reducing both direct mortality effects (e.g., increased egg/chick predation) and long-term impacts on physiological stress caused by human disturbance on nesting seabirds.

Ecological Evidence

4.4.2.3 Disturbance is known to be a major threat to seabirds (Dias *et al.,* 2019[8]). There is evidence indicating nesting guillemot are impacted by anthropogenic disturbance with Beale and Monghan (2004[10]) finding human disturbance of breeding guillemot had a negative effect on nesting success at St Abbs Head. Furthermore, tourist traffic, both on land and at sea, in close proximity to a Norwegian seabird colony was reported to cause reduced breeding success of guillemot (Jørgensen, 2019[99]). The study recommended that measures to reduce and redirect traffic around the seabird colony are required to mitigate the impacts of disturbance and to protect the breeding population.

4.4.2.4 There is evidence to suggest that guillemot are impacted by human disturbance and as such could benefit from the implementation of management at colonies. There are a range of disturbance reduction measures that can be implemented at seabird colonies including wardens, signage, path diversions and path maintenance (Allbrook and Quinn, 2020[7]).

Wider Ecological Considerations

4.4.2.5 As disturbance is known to be a major threat to a range of seabird species (Dias *et al.,* 2019[8]), disturbance-reducing measures are likely to benefit species other than guillemot also.

4.4.2.6 The potential negative consequences of disturbance reduction should also be considered. For example, disturbance-reducing measure may also reduce disturbance of predator species such as herring gull (*Larus argentatus*) meaning they could increase in number and thus increase predation on kittiwake or other seabirds (Sandvik & Barrett, 2001[9]). Thus,

the presence of nearby colonies of avian predators and their potential response to disturbance-reduction measures should be considered.

Timing of Delivery

4.4.2.7 As outlined in the feasibility sections below, there are existing, well-evidenced disturbance-reducing measures for seabirds, and the measures (e.g., closures, diversions, signage, warden employment) are straightforward to implement from both a technical and legal perspective. The measure can therefore be readily implemented as soon as site selection and any partnership agreements/contracts have been secured – there is thus no technical lead-in time (i.e., the measure will start delivering benefits immediately upon its implementation). It should be acknowledged that this measure targets an increase in seabird productivity (i.e., numbers of chick fledged per pair). There is thus an inevitable ecological time delay between implementing the measure and additional fledged birds reaching breeding age. For gannet it takes six years for any fledged juvenile to reach breeding age (Horswill and Robinson, 2015[12]). Whilst, as outlined above, there is no technical lead-in time for this measure to become effective, implementation is therefore recommended prior to operation to minimise or avoid a build-up of temporary compensation debt of adult birds (whilst awaiting birds to reach adulthood) during the early years of implementation. It should also be noted that disturbance-reducing measures, once implemented and if maintained, could deliver ongoing benefits after the decommissioning of the offshore wind farm, thus potentially providing a positive impact beyond the 35-year consent period, and providing further confidence that sufficient compensation can be delivered for the potential impacts incurred during the operational lifetime.

Monitoring

4.4.2.8 In order to successfully monitor and quantify this measure, baseline surveys as well as post implementation surveys of the measure would need to be undertaken to identify the levels of anthropogenic disturbance.

4.4.2.9 The success of the measure in reducing for example footfall, and potentially disturbance events (e.g., flushing) can be measured and monitored quantitatively. Attributing a growth in adult breeding population, or an improvement in productivity, to the disturbance reducing measure is considered to be challenging due to the indirect nature of this measure. Monitoring of the success of the measure would therefore require a combination of quantitative and qualitative evidence. Annual counts and productivity measurements would be made at the candidate site(s) following their identification, with monitoring continuing following the implementation of measures.

Adaptive Management

4.4.2.10 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective.

4.4.2.11 Examples of appropriate adaptive management adjustments for the disturbance reduction measure would include i) extending the measure through the implementation of additional signage, path diversions, wardens etc., ii) expanding the measure to cover a larger area and/or additional sites, iii) extending the duration of disturbance reduction measures.

Feasibility

Technical Feasibility

4.4.2.12 Several publications have reported the effectiveness of disturbance-reducing measures at breeding bird colonies. Lynch *et al.* (2017[13]) showed wardens; fencing and signage were effective in reducing disturbance of little tern (*Sternula albifrons*). Dowling and Weston (1999[14]) showed fencing, signage, temporary beach closures and wardens helped reduce disturbance of hooded plover (*Thinornis rubricolli*). Similarly, signs, fencing and wardens have also been shown to be an effective measure in reducing anthropogenic disturbance of breeding shorebirds (Weston *et al*., 2012[15]). Allbrook and Quinn (2020[7]) reported on the implementation of signs as a measure to reduce disturbance of gannet. Furthermore, Buxton *et al*. (2017[16]) proposed the use of signs to implement 'quiet zones' to reduce the effects of visitor noise on nesting Brandt's cormorants, following evidence of the effectiveness of signs reported by Stack *et al*. (2011[17]). Set-back distances or buffer zones have been also applied to reduce the disturbance of wetland birds (Rodgers and Smith, 1997[18]; Rodgers and Schwikert, 2002[19]) and nesting seabirds (e.g., Pfeiffer and Peter, 2004[20]). Lafferty *et al*. (2006[21]) also reported on the effectiveness of rope fencing, signs and volunteers protecting nesting snowy plover.

4.4.2.13 Further research would be needed to identify if and at which SPAs/colonies human disturbance is impacting populations and to identify suitable colonies where (additional) disturbance-reducing measures would be beneficial (for further information on site selection see Section 5 and 6).

4.4.2.14 Measures could be implemented collaboratively between the Applicant and site managers and/or landowners, or strategic funding for implementation and monitoring of the measure can be provided to sites where disturbance is an impact at a site and where management plans are in place but have limited funding or resources to implement successful measures.

4.4.2.15 Based on qualitative assessment using expert judgement, and the successful past implementation of disturbance reduction measures, it is

deemed technically feasible to implement this proposed measure for this project, with a high likelihood of success if implemented at appropriate sites.

Financial Feasibility

4.4.2.16 This measure is considered financially feasible; the full financial cost of the measure will depend on the type of site management taken forward. The measure could be implemented either through funding of wardens at the site or through the funding of contractors and other associated costs to design and install measures (e.g., signage and fencing).

Legal Feasibility

4.4.2.17 This measure is likely straightforward from a legal perspective. Prior to consent, liaison with site managers and/or landowners would be required to reach agreements. Land rights are not anticipated to be required.

4.4.3 Mammalian Predator Management and Eradication

4.4.3.1 Predation by invasive non-native mammals is considered a key threat to breeding seabird island colonies (Brooke *et al.*, 2018[22]). Mammals such as brown and black rats, feral cats and Mustelidae such as American mink are all known to predate seabird eggs, chicks and adults (Latorre *et al.*, 2013[23], Craik, 1997[24], Ratcliffe *et al.*, 2010[25]).

4.4.3.2 This measure would involve lethal or non-lethal predator control measures at a breeding colony to reduce nest predation and increase breeding success. Lethal control involves for example the use of rodenticide or other poison bait, placed within bait boxes (Zonfrillo, 2001[26]). Non-lethal control, such as the use of exclusion fencing can also be appropriate for certain sites and predators (Dalrymple, 2023[27]). It should be noted predator eradication programmes tend to be effective on islands, with predator exclusion measures, such as fencing for larger mammals, more suitable at mainland colonies.

4.4.3.3 The overarching aim of these predator control measures is to reduce direct mortality effects of mammalian predation on nesting seabirds (i.e., predation on eggs and chicks) and as such increase productivity and the population size.

Ecological Evidence

4.4.3.4 There is clear evidence that guillemot are vulnerable to mammalian predation. For example, Chivers *et al.*, 2012[100] found that predation was the main reason for breeding failure during a study at Rathlin Island (Northern Ireland). Furness (2021[29]) showed that rat eradication resulted in greatly increased breeding numbers on Lundy Island (but not on other sites such as Canna). Following the removal of the rats from the island guillemot and razorbill populations increased by 321% and 272%,

respectively, between 2000 (before eradication) and 2021 (after island was declared rat free), which suggests this population were being impacted by predators present on the island and neighbouring islands (Ørsted, 2021b[35]) (see Technical Feasibility Section below for details).

4.4.3.5 The increase in populations on Lundy was due to colonisation of previously unoccupied habitat where nests would have been vulnerable to predation (Furness, 2021[29]), showing substantial benefit from mammalian predator control/eradication through opening up additional nesting space, with resulting benefits for productivity.

4.4.3.6 Rat eradication programmes have been agreed as a viable compensatory measure elsewhere, such as for Hornsea Four OWF (DESNZ, 2023[101]).

4.4.3.7 To ensure effectiveness is maintained upon completion of eradication or exclusion, biosecurity measures would be implemented alongside mammalian predator management and/or eradication to secure benefits obtained from the eradication programmes.

Wider Ecological Considerations

4.4.3.8 Population declines of various bird species have been attributed to predation by mammals (Doherty *et al.*, 2016[32]). Within the UK and Ireland, there is evidence to suggest red foxes predate on gull chicks, eggs, and adults (Mavor *et al.*, 2001[33]). Davis *et al.* (2018[34]) indicated that herring gull productivity significantly decreased as fox sightings increased, and that predator fencing appeared to be effective in increasing herring gull breeding productivity.

4.4.3.9 Brown and black rats were eradicated from Lundy Island in the Bristol Channel between 2002 to 2004 as part of a project to improve conditions on the island for puffin and European storm petrel. Following the removal of the rats from the island razorbill populations increased by 272% between 2000 (before eradication) and 2021 (after the island was declared rat free) (Ørsted, 2021b[35]). Populations of razorbill at neighbouring colonies, namely Skomer and Castlemartin Coast, also saw a percentage increase of 93% and 32% between 2000 to 2017, respectively (Ørsted, 2021b[35]).

4.4.3.10 There is also increasing evidence of the effectiveness of removal or control of mammalian predators to increase breeding success and adult survival at seabird colonies around the world including islands around New Zealand (Towns and Broome, 2003[36]; Rayner *et al.*, 2007[37]).

4.4.3.11 Further examples from various seabird breeding colonies include Cooper *et al.* (1995[38]); Keitt and Tershy (2003[39]); Williams, Byrd and Konyukhov (2003[40]) and Brooke *et al* (2018[22]).

4.4.3.12 Given the evidence presented above it is feasible that the implementation of a predator control/eradication measure can, in time, deliver substantial

benefits for the wider national site network/Natura 2000 network and for a wider range of seabirds.

Timing of Delivery

4.4.3.13 As outlined in the feasibility sections below, there is extensive technical and legal precedent for mammalian predator eradication across the UK. The measure can therefore be readily implemented, using current guidelines and best practice, as soon as site selection, legal permissions and contracts have been secured. It should be acknowledged that this measure targets an increase in seabird productivity (i.e., numbers of chick fledged per pair). There is thus an inevitable ecological time delay between implementing the measure and additional fledged birds reaching breeding age. For guillemot it takes six years for any fledged juvenile to reach breeding age (Horswill and Robinson, 2015[12]), before the implemented measure begins to compensate for the predicted impacts. Whilst, as outlined above, there is no technical lead-in time for this measure to become effective, implementation is therefore recommended prior to operation to minimise or avoid a build-up of temporary compensation debt of adult birds (whilst awaiting birds to reach adulthood) during the early years of implementation. It should also be noted that eradication and control measures, once implemented and if maintained with biosecurity, could deliver ongoing benefits long after the decommissioning of the offshore wind farm, thus potentially providing a positive impact well beyond the 35-year consent period, and providing further confidence that sufficient compensation can be delivered for the potential impacts incurred during the operational lifetime.

Monitoring

4.4.3.14 Monitoring of the site and colony pre- and post-implementation is essential to confirm the complete removal as well as the implementation of biosecurity to remove the risk of incursion.

4.4.3.15 Monitoring of population size and productivity, alongside the monitoring of any other relevant environmental variables, can be used to infer success of this compensation measure.

Adaptive Management

4.4.3.16 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective.

4.4.3.17 Examples of appropriate adaptive management for mammalian predator control could include i) expanding mammalian control to other locations, ii)

monitoring fences to identify potential damage to restore, iii) improving fence design (e.g., addition of overhangs, buried barriers or electric fencing) and/or iiii) increased biosecurity measures.

Feasibility

Technical Feasibility

4.4.3.18 This measure could be delivered by the project alone, or through supporting a planned or existing initiative. There is considerable precedent for carrying out invasive species management, such as rodent eradication and large mammal exclusion. There is a wealth of knowledge on appropriate techniques and technical kit (e.g., traps and fences). Eradication of invasive mammalian species have been previously proven to be improve breeding of guillemot colonies. This measure has best practise guidance from the UK (Thomas *et al.*, 2017[41]) as well as many examples of successful programmes (Zonfrillo, 2001[26], The Landmark Trust, 2024[102], Shiant Islands, 2024[103]). Specialist teams can also be called upon to advise and assist in any predator management programmes. Predator management is thus considered a highly feasible measure from a technical perspective.

4.4.3.19 Based on qualitative assessment using expert judgement, and the highly successful implementation of mammalian predator management and eradication measure in the UK, it is deemed technically feasible to implement this proposed measure for this project, with a high likelihood of success if implemented at appropriate sites.

Financial Feasibility

4.4.3.20 The cost of this measure is highly dependent on the location and scale of the control methods and their success. It is likely to have a significant financial cost due to the cost of full eradication, biosecurity and the- level of monitoring required pre- and post-implementation. It would be less costly to fund an existing (or planned) eradication programme compared to developing an eradication programme from scratch.

Legal Feasibility

4.4.3.21 Existing guidance, such as the UK Rodent Eradication Best Practice Toolkit (Thomas, 2017[41]), and specialist eradication teams can be used to ensure all relevant legislation is adhered to. Licences would be required for the implementation of control measures, and landowner agreement would be needed.

4.4.3.22 The potential for a negative public perception around this measure, dependent on the control measure and target species, should be considered.

4.4.4 Non-lethal Avian Predator Control

4.4.4.1 Avian predation of seabird eggs, chicks or adults is widespread, with key UK avian predator species including great black-backed gull (*Larus marinus*), hooded crow (*Corvus cornix*) and great skua (Lopez *et al.*, 2023[42]; Johnston *et al.*, 2019[43]; Votier *et al.*, 2004[44]).

4.4.4.2 In addition to predation, other bird species can affect seabirds through kleptoparasitism, involving the stealing of food from other birds, as frequently observed to occur by great skua and great black-backed gull (Garthe and Hüppop, 1998[45]). This can reduce food availability for the affected species, with potential impacts on survival and productivity.

4.4.4.3 The proposed measure would involve the non-lethal exclusion of avian predators from a buffer zone around a breeding colony to reduce breeding failure due to predation.

4.4.4.4 The management of avian predators could be achieved through scaring techniques, including the use of scarecrows, human disturbance (e.g., wardens), distress callers (which play distress calls of the avian predator) and auditory deterrents such as humming lines and scarer ropes (Morrison and Allcorn, 2006[46]).

4.4.4.5 In addition, predation prevention may be achieved through the recovery and at-sea release of fledglings which have not yet left the colony and are thus susceptible to predation (as carried out for puffin at the Isle of May; The Scotsman, 2021[104]).

Ecological Evidence

4.4.4.6 Predation of guillemot eggs is frequently observed in Shetland and the east coast of Scotland (Furness, 2013[31]). Herring gull, lesser black-backed gull and greater black-backed gulls (large gulls) are predominantly the cause of reduced productivity (Mavor *et al.*, 2008[105]; Walsh *et al.*, 1992[106]; Thompson *et al.*, 1999[107]).

4.4.4.7 It was also shown that the COVID-19 lockdown led to the disappearance of visitors and a resulting increase in the number of white-tailed eagles, causing a decrease in the productivity rate of guillemot through disturbance and predation (Hentati-Sundberg *et al.*, 2023[108]).

4.4.4.8 There is evidence showing that non-lethal avian predator control can be successful for some seabird colonies (Babcock and Booth, 2020[50]). Management techniques such as scarecrows, human disturbance (e.g., wardens), distress callers, humming lines and scarer ropes have been shown to have varying degrees of success when deployed on Coquet Island; however, a range of methods deployed over the breeding season would be most appropriate to reduce gull habitation to these techniques (Morrison and Allcorn, 2006).

4.4.4.9 Overall, this measure has the potential to reduce predation, with a subsequent positive effect on guillemot productivity and survival rate.

Wider Ecological Considerations

4.4.4.10 Large gull species are declining across the UK, (Burnell *et al.*, 2023[51]), though have so far shown quite limited sensitivity to HPAI (Tremlett *et al.*, 2024[53]), while great skua populations have generally been increasing in size in recent years (Burnell *et al.*, 2023[51]), but have been severely impacted by HPAI (Tremlett *et al.*, 2024[53]). Therefore, predator control may compromise the conservation objectives of designated sites where these species are named as designated features. Furthermore, there is still risk of negatively impacting other birds at the site with the implementation of scaring techniques that involve acoustics. Careful consideration of this measure, with the wider ecological context weighed up against the benefits, is needed, to ensure this compensation measure is a suitable option from a holistic conservation perspective. Careful site selection will be key in ensuring that this measure, if deployed, is optimally implemented to minimise negative side-effects on other species.

4.4.4.11 However, positive wider ecological benefits of avian predator control include benefits to other seabird species impacted by avian predation.

Timing of Delivery

4.4.4.12 As outlined in the feasibility sections below, there are existing, well-evidenced avian predator control measures, and the measures (e.g., visual and auditory deterrents) are straightforward to acquire and implement from both a technical and legal perspective. The measure can then be readily implemented as soon as site selection and any partnership agreements/contracts have been secured – there is thus no technical lead-in time anticipated. It should be acknowledged that this measure targets an increase in seabird productivity (i.e., numbers of chick fledged per pair). There is thus an inevitable ecological time delay between implementing the measure and additional fledged birds reaching breeding age. For guillemot it takes six years for any fledged juvenile to reach breeding age (Horswill and Robinson, 2015[12]). Whilst, as outlined above, there is no technical lead-in time for this measure to become effective, implementation is therefore recommended prior to operation to minimise or avoid a build-up of temporary compensation debt of adult birds (whilst awaiting birds to reach adulthood) during the early years of implementation.

Monitoring

4.4.4.13 Monitoring of the site and colony pre- and post- implementation is essential to confirm that there is a reduction of disturbance and predation.

Adaptive Management

4.4.4.14 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective.

4.4.4.15 Examples of appropriate adaptive management for the non-lethal exclusion of avian predators could include i) extending the measure through the use of additional scaring techniques, such as scarecrows, wardens, or auditory deterrents ii) expanding the exclusion zone to cover a larger buffer area or additional breeding colonies where predation by species are common, and/or iii) adjusting the duration of exclusion efforts based on predator activity during the seabird breeding season to enhance protection.

Feasibility

Technical Feasibility

4.4.4.16 A number of non-lethal avian predator control measures have been successfully implemented and benefited seabirds (e.g., Morrison and Allcorn, 2006[46]). This measure is thus feasible from a technical perspective.

4.4.4.17 Site selection work is needed to identify which colonies may suffer have avian predation issues, and effective methods of control will need to be evaluated and designed (either before or during the implementation of this measure).

4.4.4.18 Based on qualitative assessment using expert judgement, and the past successful implementation of non-lethal avian predator control measures, it is deemed technically feasible to implement this proposed measure for this project, with a high likelihood of success if implemented at appropriate sites.

Financial Feasibility

4.4.4.19 The cost of this measure would be dependent on the location, scale of control, and method used, but is generally considered feasible by the Applicant.

Legal Feasibility

4.4.4.20 Landowner agreement and any relevant licensing would need to be secured in advance of implementing this measure.

4.4.4.21 Potential negative public perception of this measure would need to be considered.

4.4.5 Bycatch Mitigation

4.4.5.1 Seabird bycatch from commercial fishing activity is considered to be a global concern (Žydelis *et al.*, 2013[56]; Anderson *et al.*, 2011[57]; Miles *et al.*, 2020[58]) with approximately 100 species impacted worldwide (Dias *et al.*, 2019[8]). Hundreds of thousands of seabird mortalities are estimated annually worldwide within gillnets (400,000; Žydelis *et al.*, 2013[56]) and longline fisheries (320,000; Anderson *et al.*,2011[57]). According to a recent review undertaken by Ramírez *et al.* (2024[59]) an average of 195,000 seabirds are by-caught in European waters per year (ranging between 130,000 to 380,000 seabird). As such, bycatch is considered one of the top three threats to global seabird populations (Dias *et al.*, 2019[8]).

4.4.5.2 This compensation measure involves the trialling and/or implementation of bycatch reduction techniques to reduce seabird bycatch with the aim of increasing survival and population size.

Ecological Evidence

4.4.5.3 Guillemot have been identified as particularly vulnerable to bycatch, according to the risk assessment model used in Bradbury *et al.* (2017[61]) these species are within the top ten (of 53) of the most sensitive species to bycatch by surface, pelagic, and benthic fishing gear. This species was identified to be within the top 10% of the seabird species most sensitive to bycatch by surface fishing gears (Bradbury *et al.*, 2017). According to Northridge *et al.* (2020[66]) approximately 1,600 to 2,500 guillemot are by-caught each year, primarily within coastal net fisheries (Northridge *et al.*, 2020[66]). Within the Northeast Atlantic 27,667 guillemot are by-caught annually and this species is most affected seabird species within European waters (number of bycaught individuals annually) (Ramírez *et al.*, 2024[59]).

4.4.5.4 Several studies and trials on bycatch mitigation for guillemot have been carried out (see "technical feasibility" section below). Given the scale of the bycatch issue in guillemot, the availability of potential bycatch mitigation technologies, and the need for further monitoring and research, the trialling or implementation of bycatch reduction measures is a feasible compensation measure.

Wider Ecological Considerations

4.4.5.5 As per Northridge *et al.* (2020[66]) guillemot, gannet, gull species, and razorbill would all benefit from bycatch reduction measures. Northridge *et al.* (2020[66]) estimates UK annual bycatch of approximately 50 kittiwake, 4,000 guillemot, 260 razorbill and 600 gannet.

4.4.5.6 According to Miles *et al.* (2020[58]) bycatch mortality accounts for more than 1% of the total annual adult mortality for seven of the ten seabird species studied, including guillemot and gannet. It was also noted that many UK seabird species lack bycatch estimates because they have not been

recorded by the UK BMP. Some species, such as divers (excluding great northern diver), black guillemot, and various shearwaters, have been shown to have high bycatch rates in other countries, raising questions about whether UK bycatch for these species is under-recorded, unsampled, or genuinely low. Furthermore, modelled impacts found that great cormorant, great northern diver and northern fulmar showed an estimated population increase of more than 1% over 25 years when bycatch mortality was removed (Miles *et al.*, 2020[58]).

4.4.5.7 Given the evidence presented above it is feasible that the implementation of a bycatch mitigation measure could, in time, deliver benefits for the wider national site network/Natura 2000 network and for a wide range of seabirds, as well as potentially marine mammals.

Timing of Delivery

4.4.5.8 It is anticipated that a minimum of one to two years is needed to further engage with the fishing industry and plan the implementation of monitoring and/or trials. Once at-sea trials are implemented, compensation gains are immediate as this measure would prevent bycatch of adult birds (as well as juveniles), thus directly benefiting the adult breeding population. Given the sporadic nature of bycatch events, extensive on-board monitoring on multiple vessels across multiple areas is likely required. This could involve either human observers, or remotely collected data. Monitoring methods are well established thus highly feasible, albeit relatively costly.

Monitoring

4.4.5.9 Given the sporadic nature of bycatch events, extensive on-board monitoring on multiple vessels across multiple areas is likely required. This could involve either human observers, or remotely collected data. Monitoring methods are well established thus highly feasible, albeit relatively costly.

Adaptive Management

4.4.5.10 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective.

4.4.5.11 Examples of appropriate adaptive management for seabird bycatch reduction could include i) trialling alternative techniques to test their implementation capabilities, ii) applying successful bycatch reduction technologies to other locations or fisheries, and/or iii) expanding the use of bycatch reduction technologies to more vessels within the fishery.

Feasibility

Technical Feasibility

Bycatch Monitoring

4.4.5.12 The focus of research, and in turn bycatch reduction, has largely been on longline fishery bycatch, although there is evidence to suggest that gillnet fisheries likely pose a greater risk to global seabird populations (Žydelis *et al.*, 2013[56]; Pott and Weidenfeld, 2017[68]; Dias *et al.*, 2019[8]). Despite this, on-board observer monitoring coverage is low relative to the scale of commercial fishing, therefore bycatch monitoring and reporting is limited (Pott and Wiedenfeld, 2017[68]). Total bycatch mortality estimates are often derived from incidental recordings of bycatch. Additionally, only a small proportion of monitoring programmes are focused on bycatch monitoring, as such long-term datasets are often limited and/or unavailable (ICES, 2018).

4.4.5.13 Northridge *et al.* (2020[66]) and Miles *et al.* (2020[58]) undertook an analysis of the UK Bycatch Monitoring Programme (BMP) data which has identified areas of concern around the UK and contributed to closing knowledge gaps. Within the UK, static net (set gillnet) fisheries were deemed an important fishery with regards to guillemot, razorbill and gannet bycatch, and longline fisheries as an important fishery with regards to gannet bycatch. However, the coverage of the UK BMP is limited, with <1% of static net, 1-2% of longline, and roughly 5% of midwater trawl fishing effort being monitored.

4.4.5.14 There are established methods for monitoring, using both on-board observers and electronic monitoring methods. Monitoring of guillemot bycatch, in combination with mitigation trials where feasible, is thus technologically highly feasible.

Bycatch Mitigation Trials

4.4.5.15 Hornsea Four conducted a review of available evidence of bycatch reduction methods for guillemot and razorbill in coastal static gillnet fisheries as part of the submission document B2.8.1 Compensation measures for FFC SPA: Bycatch Reduction: Ecological Evidence. A long list of bycatch reduction techniques was collated based upon measures included in Wiedenfeld *et al.* (2015[109]), Parker (2017[79]), with other potential technologies identified through a wider literature review. The shortlisted measures were net illumination, visual net modification, acoustic deterrents and above water deterrents. The above water deterrent Looming Eyes Buoy (LEBs) was identified for trial. It is a deterrent designed to prevent seabird diving close to gillnets and entering areas high-risk bycatch zones whilst minimising habituation using visual stimuli (Rouxel *et al.*, 2021[110]).

4.4.5.16 According to Anderson *et al.* (2022[70]), there is currently no one bycatch reduction technique suitable for all UK static net fisheries. Although most UK static net fisheries deploy monofilament nets, the gear used (such as

gillnets, trammel nets, and tangle nets) can vary between fisheries and vessels. Consequently, it is unlikely that one bycatch reduction method would be effective across all UK static net fisheries. Anderson *et al.* (2022[70]) recommends conducting additional trials of bycatch reduction techniques within UK gillnet fisheries, while also suggesting the interim use of non-technical methods (e.g., time and area closures, deck lighting, offal management, night and twilight setting). For a comprehensive list of non-technical bycatch reduction methods, refer to Anderson *et al.* (2022[70]).

LEB Trials

4.4.5.17 Several LEB trials have been undertaken within European waters, including by Rouxel *et al.* (2021[110]) within the Baltic Sea. LEB design consisted of a three-dimensional rotating device simulating an eye pattern. The eye pattern on each face of the device were different sizes; when the panels rotate a 'looming' effect is created. The device moves with the wind, creating unpredictable movements and rotation speeds, which intensifies behavioural responses and reduces the chances of habituation (Gregor *et al.*, 2014[111]; Schnell, 2019[112]). Long-tailed ducks were the most observed species in the Rouxel *et al.* (2021[110]) study, therefore the statistical analysis focused on this species. This study found the numbers of ducks observed within a 50m radius of the LEBs were reduced by 20 to 30%.

4.4.5.18 Further trials have been undertaken in Iceland within Húnaflói Bay (Rouxel *et al.*, 2023[113]). Seabirds bycatch occurred within 214 out of 875 control nets and 36 out of 61 LEB nets. This included 48 common guillemots and 29 black guillemots. The authors concluded that there is no evidence that the LEB explained any variation in seabird bycatch.

4.4.5.19 Further LEB trials are being undertaken by Hornsea Four within an active UK fishery in the southwest of England, and by the Royal Society for the Protection of Birds (RSPB) in a similar location to Hornsea Four, the results of which are yet to be published.

4.4.5.20 An annual bycatch baseline in the east coast of Scotland would be essential to understand the extent of the bycatch issue for guillemot in that area, and the benefit that a bycatch reduction technology may yield. Monitoring is thus an essential component of this measure.

Industry Relationships

4.4.5.21 A further key feasibility consideration for bycatch mitigation work is the need for strong working relationships with the fishing industry and relevant regulators. When looking to implement monitoring or trials, close partnerships with skippers are needed to address any concerns around the impacts of the proposed programme on for example hauls, physical space on the vessel, workloads and health and safety of crew members (Kingston *et al.,* 2023[60]).

4.4.5.22 The Applicant is carrying out a pilot study in collaboration with fishing vessels in the greater Moray Firth area between April and October 2024 to

assess the feasibility of data collection on bycatch in the area, as well as to collect information on the types of interaction observed between vessels and seabird species. Vessels using a range of methods (e.g., static, scallops, trawl/nephrops) have been included within the pilot study. The findings of the study will be used to assist in the planning of extended monitoring in future years. The Applicant is thus well placed to undertake collaborative work with the fishing industry due to its longstanding relationships with the industry in the Moray Firth region.

Conclusion

4.4.5.23 Based on the existing research base and available guidelines on monitoring, and available technologies for monitoring and bycatch reduction, this measure is deemed highly feasible to implement. Technology refinements and further research is likely needed as part of the implementation of this measure, which will aid in filling knowledge gaps in order to reduce seabird bycatch and thereby benefit their populations.

Financial Feasibility

4.4.5.24 Given the sporadic nature of bycatch events, extensive on-board monitoring on many vessels across multiple areas is likely required. This measure is likely to have a significant financial cost due to the intensive, widespread monitoring required. This measure may thus be best suited as either an industry-level or strategic measure delivered in conjunction with other developers, but could be developed by the project alone should this collaborative compensation not be possible.

Legal Feasibility

4.4.5.25 Researching, monitoring and trialling bycatch technology is unlikely to have any legal constraints. Implementation of these measure would require active engagement with fisheries and fisheries stakeholders.

4.5 Puffin

4.5.1 Overview

4.5.1.1 Discussed below is the short list of potential measures deemed suitable to be taken forward for next steps for compensation development for puffin:

- Reduction of disturbance at colonies;
- Mammalian predator management and eradication;
- Non-lethal avian predator control; and
- Management of supporting habitats at colony.

4.5.2 Reduction of Disturbance at Colonies

Introduction

4.5.2.1 Anthropogenic disturbance is caused by the presence of external stimuli (such as people, pets and vehicles) within close proximity to colonies, resulting in temporary flushing or permanent abandonment of nesting sites, as well as reducing time for the acquisition of resources and allowing nests to be targeted by predators (Carney and Sydeman, 1999[4]; Buckley, 2004[5]; Frederiksen, 2010[6]).

4.5.2.2 Reduction measures that can be implemented include the introduction of wardens, signage, path diversions and path maintenance (Allbrook and Quinn, 2020[7]). The overarching aim of these disturbance reduction measures is to increase productivity by reducing both direct mortality effects (e.g., increased egg/chick predation) and long-term impacts on physiological stress caused by human disturbance on nesting seabirds.

Ecological Evidence

4.5.2.3 Disturbance is known to be a major threat to seabirds (Dias *et al.,* 2019[8]). There is evidence to suggest that breeding puffin are sensitive to human disturbance at breeding colonies, particularly during incubation (e.g., Rodway *et al.*, 1996[114]; Harris and Wanless, 2011[115]; Harris *et al.*, 2012[116]) Rodway *et al.* (1996[114]) reported puffin often abandon their eggs when disturbed and chick productivity was reduced by 38% within disturbed study plots on Great Island, Newfoundland Canada.

4.5.2.4 There is evidence to suggest that puffin are impacted by human disturbance and as such could benefit from the implementation of management at colonies. There are a range of disturbance reduction measures that can be implemented at seabird colonies including wardens, signage, path diversions and path maintenance (Allbrook and Quinn, 2020[7]).

Wider Ecological Considerations

4.5.2.5 As disturbance is known to be a major threat to a range of seabird species (Dias *et al.,* 2019[8]), disturbance-reducing measures are likely to benefit species other than puffin also.

4.5.2.6 The potential negative consequences of disturbance reduction should also be considered. For example, disturbance-reducing measure may also reduce disturbance of predator species such as herring gull (*Larus argentatus*) meaning they could increase in number and thus increase predation on kittiwake or other seabirds (Sandvik & Barrett, 2001[9]). Thus, the presence of nearby colonies of avian predators and their potential response to disturbance-reduction measures should be considered.

Timing of Delivery

4.5.2.7 As outlined in the feasibility sections below, there are existing, well-evidenced disturbance-reducing measures for seabirds, and the measures (e.g., closures, diversions, signage, warden employment) are straightforward to implement from both a technical and legal perspective. The measure can therefore be readily implemented as soon as site selection and any partnership agreements/contracts have been secured – there is thus no technical lead-in time (i.e., the measure will start delivering benefits immediately upon its implementation). It should be acknowledged that this measure targets an increase in seabird productivity (i.e., numbers of chick fledged per pair). There is thus an inevitable ecological time delay between implementing the measure and additional fledged birds reaching breeding age. For puffin it takes five years for any fledged juvenile to reach breeding age (Horswill and Robinson, 2015[12]). Whilst, as outlined above, there is no technical lead-in time for this measure to become effective, implementation is therefore recommended prior to operation to minimise or avoid a build-up of temporary compensation debt of adult birds (whilst awaiting birds to reach adulthood) during the early years of implementation. It should also be noted that disturbance-reducing measures, once implemented and if maintained, could deliver ongoing benefits after the decommissioning of the offshore wind farm, thus potentially providing a positive impact beyond the 35-year consent period, and providing further confidence that sufficient compensation can be delivered for the potential impacts incurred during the operational lifetime.

Monitoring

4.5.2.8 In order to successfully monitor and quantify this measure, baseline surveys as well as post implementation surveys of the measure would need to be undertaken to identify the levels of anthropogenic disturbance.

4.5.2.9 The success of the measure in reducing for example footfall, and potentially disturbance events (e.g., flushing) can be measured and monitored quantitatively. Attributing a growth in adult breeding population, or an improvement in productivity, to the disturbance reducing measure is considered to be challenging due to the indirect nature of this measure. Monitoring of the success of the measure would therefore require a combination of quantitative and qualitative evidence. Annual counts and productivity measurements would be made at the candidate site(s) following their identification, with monitoring continuing following the implementation of measures.

Adaptive Management

4.5.2.10 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective.

4.5.2.11 Examples of appropriate adaptive management adjustments for the disturbance reduction measure would include i) extending the measure through the implementation of additional signage, path diversions, wardens etc., ii) expanding the measure to cover a larger area and/or additional sites, iii) extending the duration of disturbance reduction measures.

Feasibility

Technical Feasibility

4.5.2.12 Several publications have reported the effectiveness of disturbance-reducing measures at breeding bird colonies. Lynch *et al.* (2017[13]) showed wardens; fencing and signage were effective in reducing disturbance of little tern (*Sternula albifrons*). Dowling and Weston (1999[14]) showed fencing, signage, temporary beach closures and wardens helped reduce disturbance of hooded plover (*Thinornis rubricolli*). Similarly, signs, fencing and wardens have also been shown to be an effective measure in reducing anthropogenic disturbance of breeding shorebirds (Weston et al., 2012[15]). Allbrook and Quinn (2020[7]) reported on the implementation of signs as a measure to reduce disturbance of gannet. Furthermore, Buxton *et al*. (2017[16]) proposed the use of signs to implement 'quiet zones' to reduce the effects of visitor noise on nesting Brandt's cormorants, following evidence of the effectiveness of signs reported by Stack *et al*. (2011[17]). Set-back distances or buffer zones have been also applied to reduce the disturbance of wetland birds (Rodgers and Smith, 1997[18]; Rodgers and Schwikert, 2002[19]) and nesting seabirds (e.g., Pfeiffer and Peter, 2004[20]). Lafferty *et al*. (2006[21]) also reported on the effectiveness of rope fencing, signs and volunteers protecting nesting snowy plover.

4.5.2.13 Further research would be needed to identify if and at which SPAs/colonies human disturbance is impacting populations and to identify suitable colonies where (additional) disturbance-reducing measures would be beneficial (for further information on site selection see Section 5 and 6).

4.5.2.14 Measures could be implemented collaboratively between the Applicant and site managers and/or landowners, or strategic funding for implementation and monitoring of the measure can be provided to sites where disturbance is an impact at a site and where management plans are in place but have limited funding or resources to implement successful measures.

4.5.2.15 Based on qualitative assessment using expert judgement, and the successful past implementation of reduction of disturbance, it is deemed

technically feasible to implement this proposed measure for this project, with a high likelihood of success if implemented at appropriate sites.

Financial Feasibility

4.5.2.16 This measure is considered financially feasible; the full financial cost of the measure will depend on the type of site management taken forward. The measure could be implemented either through funding of wardens at the site or through the funding of contractors and other associated costs to design and install measures (e.g., signage and fencing).

Legal Feasibility

4.5.2.17 This measure is likely straightforward from a legal perspective. Prior to consent, liaison with site managers and/or landowners would be required to reach agreements. Land rights are not anticipated to be required.

4.5.3 Mammalian Predator Management and Eradication

4.5.3.1 Predation by invasive non-native mammals is considered a key threat to breeding seabird island colonies (Brooke *et al.*, 2018[22];). Mammals such as brown and black rats, feral cats and Mustelidae such as American mink are all known to predate seabird eggs, chicks and adults (Latorre *et al.*, 2013[23], Craik, 1997[24], Ratcliffe *et al.*, 2010[25]).

4.5.3.2 This measure would involve lethal or non-lethal predator control measures at a breeding colony to reduce nest predation and increase breeding success. Lethal control involves for example the use of rodenticide or other poison bait, placed within bait boxes (Zonfrillo, 2001[26]). Non-lethal control, such as the use of exclusion fencing can also be appropriate for certain sites and predators (Dalrymple, 2023[27]). It should be noted predator eradication programmes tend to be effective on islands, with predator exclusion measures, such as fencing for larger mammals, more suitable at mainland colonies.

4.5.3.3 The overarching aim of these predator control measures is to reduce direct mortality effects of mammalian predation on nesting seabirds (i.e., predation on eggs and chicks) and as such increase productivity and the population size.

Ecological Evidence

4.5.3.4 There is evidence to suggest puffin are vulnerable to mammalian predators. There are records of black rat predating on puffin (and razorbill) eggs and chicks on the Shaint Isles (Shaint Isles, 2024[103]). Additionally, an eradication programme of brown and black rats was undertaken on Lundy Island in the Bristol channel between 2002 and 2004 with the overarching aim to improve conditions on the island for puffin and European storm petrel (Ørsted, 2021b[35]). Following the eradication of rats from Lundy Island, puffin (and other auk species) were observed nesting in previous

unoccupied areas (Booker *et al.*, 2008[117]). These nesting sites were previously inhabited by rats but are now a safe area available for seabirds to exploit (Booker *et al.*, 2008[117]). The puffin population at Lundy Island is now estimated to 1,335 individuals compared to 13 individuals in 2000, according to the Seabird Monitoring Programme (SMP; BTO, 2024[130]).

4.5.3.5 Rat eradication programmes have been agreed as a viable compensatory measure elsewhere, such as for Hornsea Four OWF (DESNZ, 2023[101]).

4.5.3.6 To ensure ecological is maintained upon completion of eradication or exclusion, biosecurity measures would be implemented alongside mammalian predator management and/or eradication to secure benefits obtained from the eradication programmes.

Wider Ecological Considerations

4.5.3.7 Population declines of various bird species have been attributed to predation by mammals (Doherty *et al.*, 2016[32]). Within the UK and Ireland, there is evidence to suggest red foxes predate on gull chicks, eggs, and adults (Mavor *et al.*, 2001[33]). Davis *et al.* (2018[34]) indicated that herring gull productivity significantly decreased as fox sightings increased, and that predator fencing appeared to be effective in increasing herring gull breeding productivity.

4.5.3.8 Brown and black rats were eradicated from Lundy Island in the Bristol Channel between 2002 to 2004 as part of a project to improve conditions on the island for puffin and European storm petrel. Following the removal of the rats from the island guillemot and razorbill populations increased by 321% and 272%, respectively, between 2000 (before eradication) and 2021 (after the island was declared rat free) (Ørsted, 2021b[35]). Populations of guillemot and razorbill at neighbouring colonies, namely Skomer and Castlemartin Coast, also saw a percentage increase of 79% and 94% (guillemot) and 93% and 32% (razorbill) between 2000 to 2017, respectively (Ørsted, 2021b[35]).

4.5.3.9 There is also increasing evidence of the effectiveness of removal or control of mammalian predators to increase breeding success and adult survival at seabird colonies around the world including islands around New Zealand (Towns and Broome, 2003[36]; Rayner *et al.*, 2007[37]).

4.5.3.10 Further examples from various seabird breeding colonies include Cooper *et al.* (1995[38]); Keitt and Tershy (2003[39]); Williams, Byrd and Konyukhov (2003[40]) and Brooke *et al* (2018[22]).

4.5.3.11 Given the evidence presented above it is feasible that the implementation of a predator control/eradication measure can, in time, deliver substantial benefits for the wider national site network/Natura 2000 network and for a wider range of seabirds.

Timing of Delivery

4.5.3.12 As outlined in the feasibility sections below, there is extensive technical and legal precedent for mammalian predator eradication across the UK. The measure can therefore be readily implemented, using current guidelines and best practice, as soon as site selection, legal permissions and contracts have been secured. It should be acknowledged that this measure targets an increase in seabird productivity (i.e., numbers of chick fledged per pair). There is thus an inevitable ecological time delay between implementing the measure and additional fledged birds reaching breeding age. For puffin, it takes five years for any fledged juvenile to reach breeding age (Horswill and Robinson, 2015[12]), before the implemented measure begins to compensate for the predicted impacts. Whilst, as outlined above, there is no technical lead-in time for this measure to become effective, implementation is therefore recommended prior to operation to minimise or avoid a build-up of temporary compensation debt of adult birds (whilst awaiting birds to reach adulthood) during the early years of implementation. It should also be noted that eradication and control measures, once implemented and if maintained with biosecurity, could deliver ongoing benefits long after the decommissioning of the offshore wind farm, thus potentially providing a positive impact well beyond the 35-year consent period, and providing further confidence that sufficient compensation can be delivered for the potential impacts incurred during the operational lifetime.

Monitoring

4.5.3.13 Monitoring of the site and colony pre- and post-implementation is essential to confirm the complete removal as well as the implementation of biosecurity to remove the risk of incursion.

4.5.3.14 Monitoring of population size and productivity, alongside the monitoring of any other relevant environmental variables, can be used to infer success of this compensation measure.

Adaptive Management

4.5.3.15 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective.

4.5.3.16 Examples of appropriate adaptive management for mammalian predator control could include i) expanding mammalian control to other locations, ii) monitoring fences to identify potential damage to restore, iii) improving fence design (e.g., addition of overhangs, buried barriers or electric fencing) and/or iiii) increased biosecurity measures.

Feasibility

Technical Feasibility

4.5.3.17 This measure could be delivered by the project alone, or through supporting a planned or existing initiative. There is considerable precedent for carrying out invasive species management, such as rodent eradication and large mammal exclusion. There is a wealth of knowledge on appropriate techniques and technical kit (e.g., traps and fences). Eradication of invasive mammalian species have been previously proven to be improve breeding of guillemot colonies. This measure has best practise guidance from the UK (Thomas *et al.*, 2017[41]) as well as many examples of successful programmes (Zonfrillo, 2001[26], The Landmark Trust, 2024[102], Shiant Islands, 2024[103]). Specialist teams can also be called upon to advise and assist in any predator management programmes. Predator management is thus considered a highly feasible measure from a technical perspective.

4.5.3.18 Based on qualitative assessment using expert judgement, and the successful implementation of mammalian predator management and eradication measures in the UK, it is deemed technically feasible to implement this proposed measure for this project, with a high likelihood of success if implemented at appropriate sites.

Financial Feasibility

4.5.3.19 The cost of this measure is highly dependent on the location and scale of the control methods and their success. It is likely to have a significant financial cost due to the cost of full eradication, biosecurity and the- level of monitoring required pre- and post-implementation. It would be less costly to fund an existing (or planned) eradication programme compared to developing an eradication programme from scratch.

Legal Feasibility

4.5.3.20 Existing guidance, such as the UK Rodent Eradication Best Practice Toolkit (Thomas, 2017[41]), and specialist eradication teams can be used to ensure all relevant legislation is adhered to. Licences would be required for the implementation of control measures, and landowner agreement would be needed.

4.5.3.21 The potential for a negative public perception around this measure, dependent on the control measure and target species, should be considered.

4.5.4 Non-lethal Avian Predator Control

4.5.4.1 Avian predation of seabird eggs, chicks or adults is widespread, with key UK avian predator species including great black-backed gull , hooded crow and great skua (Lopez *et al.*, 2023[42], Johnston *et al.*, 2019[43]; Votier *et al.*, 2004[44]).

4.5.4.2 In addition to predation, other bird species can affect seabirds through kleptoparasitism, involving the stealing of food from other birds, as frequently observed to occur by great skua and great black-backed gull (Garthe and Hüppop, 1998[45]). This can reduce food availability for the affected species, with potential impacts on survival and productivity.

4.5.4.3 The proposed measure would involve the non-lethal exclusion of large gull species and/or other avian predators from a buffer zone around a breeding colony to reduce breeding failure due to predation.

4.5.4.4 The management of avian predators could be achieved through scaring techniques, including the use of scarecrows, human disturbance (e.g., wardens), distress callers (which play distress calls of the avian predator) and auditory deterrents such as humming lines and scarer ropes (Morrison and Allcorn, 2006[46]).

4.5.4.5 In addition, predation prevention can be achieved through the recovery and at-sea release of fledglings which have not yet left the colony and are thus susceptible to predation (as carried out for puffin at the Isle of May; The Scotsman, 2021[104]).

Ecological Evidence

4.5.4.6 Puffins are subject to predation by great skuas in the Hermaness, Shetland and St Kilda with varying consumption rates at each site (Votier *et al.*, 2004[44]). Kleptoparasitisim of puffin by great skua is frequently observed at Hermaness, with puffin chased and caught to release food (Andersson, 1976[47]).

4.5.4.7 The reduction of herring gull and lesser black-backed gull nests was linked to an increased recruitment rate of puffins to the breeding colony on the Isle of May (Finney *et al.*, 2003[118]). Furthermore, puffins breeding in gull-free habitat on the Isle of May provisioned their chicks at a higher rate, with lower risk of kleptoparasitism compared to those in gull-occupied habitats (Finney *et al.*, 2001[119]).

Wider Ecological Considerations

4.5.4.8 Large gull species are declining across the UK, (Burnell *et al.*, 2023[51]), though have so far shown quite limited sensitivity to HPAI (Tremlett *et al.*, 2024[53]), while great skua populations have generally been increasing in size in recent years (Burnell *et al.*, 2023[51]), but have been severely impacted by HPAI (Tremlett *et al.*, 2024[53]). Therefore, predator control

may compromise the conservation objectives of designated sites where these species are named as designated features. Furthermore, there is still risk of negatively impacting other birds at the site with the implementation of scaring techniques that involve acoustics. Careful consideration of this measure, with the wider ecological context weighed up against the benefits, is needed, to ensure this compensation measure is a suitable option from a holistic conservation perspective. Careful site selection will be key in ensuring that this measure, if deployed, is optimally implemented to minimise negative side-effects on other species.

4.5.4.9 However, positive wider ecological benefits of avian predator control include benefits to other seabird species impacted by avian predation.

Timing of Delivery

4.5.4.10 As outlined in the feasibility sections below, there are existing, well-evidenced avian predator control measures, and the measures (e.g., visual and auditory deterrents) are straightforward to acquire and implement from both a technical and legal perspective. The measure can then be readily implemented as soon as site selection and any partnership agreements/contracts have been secured – there is thus no technical lead-in time anticipated. It should be acknowledged that this measure targets an increase in seabird productivity (i.e., numbers of chick fledged per pair). There is thus an inevitable ecological time delay between implementing the measure and additional fledged birds reaching breeding age. For puffin it takes five years for any fledged juvenile to reach breeding age (Horswill and Robinson, 2015[12]). Whilst, as outlined above, there is no technical lead-in time for this measure to become effective, implementation is therefore recommended prior to operation to minimise or avoid a build-up of temporary compensation debt of adult birds (whilst awaiting birds to reach adulthood) during the early years of implementation.

Monitoring

4.5.4.11 Monitoring of the site and colony pre- and post- implementation is essential to confirm that there is a reduction of disturbance and predation.

Adaptive Management

4.5.4.12 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective.

4.5.4.13 Examples of appropriate adaptive management for the non-lethal exclusion of avian predators could include i) extending the measure through the use of additional scaring techniques, such as scarecrows, wardens, or auditory

deterrents ii) expanding the exclusion zone to cover a larger buffer area or additional breeding colonies where predation by species are common, and/or iii) adjusting the duration of exclusion efforts based on predator activity during the seabird breeding season to enhance protection.

Feasibility

Technical Feasibility

4.5.4.14 A number of non-lethal avian predator control measures have been successfully implemented and benefited seabirds (e.g., Morrison and Allcorn, 2006[46]). This measure is thus feasible from a technical perspective.

4.5.4.15 Site selection work is needed to identify which colonies may suffer have avian predation issues, and effective methods of control will need to be evaluated and designed (either before or during the implementation of this measure).

4.5.4.16 Based on qualitative assessment using expert judgement, and evidence of past successful implementation of non-lethal avian predator control measures, it is deemed technically feasible to implement this proposed measure for this project, with a high likelihood of success if implemented at appropriate sites.

Financial Feasibility

4.5.4.17 The cost of this measure would be dependent on the location, scale of control, and method used, but is generally considered feasible by the Applicant.

Legal Feasibility

4.5.4.18 Landowner agreement and any relevant licensing would need to be secured in advance of implementing this measure.

4.5.4.19 Potential negative public perception of this measure would need to be considered.

4.5.5 Restoration or Maintenance of Breeding Sites

4.5.5.1 Habitat quality can influence seabirds' choice of breeding sites (Forbes and Kaiser, 1994[120]; Kildaw *et al.*, 2005[121]). The proposed restoration and maintenance of breeding sites would involve the removal of limiting factors to nesting space and quality, such as vegetation (invasive and non-invasive) to create suitable breeding habitats for puffin. This measure can expand the carrying capacity of an existing site or allow recolonisation of a site which has fallen out of use, thereby expanding productivity and/or population size.

4.5.5.2 Restoration of breeding sites in some seabird species has been found to be especially effective when implemented in conjunction with addressing other causes of declines of the species, to allow faster colony establishment and

growth (Jones and Kress, 2012[122]). For example, vegetation management was included alongside management of predators at the Eastern Egg Rock, Maine, restoring breeding habitat space for puffin (Jones *et al.*, 2011[123]).

4.5.5.3 Vegetation management techniques include the use of herbicides, manual removal, controlled burning, and the introduction of grazers and soil removal (Lamb, 2015[124]).

Ecological Evidence

4.5.5.4 Access to nesting burrows by puffin can be affected by growth of tall, dense, vegetation. For example, invasive tree mallow has colonised several islands in the Forth Islands SPA (e.g., Craigleith, Fidra, The Lamb), resulting in substantive declines in numbers of breeding puffin. The initial growth was driven by human-induced changes which reduced the limitation on tree mallow population growth (grazer population, climatic condition, nutrient limitation and gemination) (van der Wal *et al.*, 2008[125]). The removal of tree mallow on Craigleith has been associated with recovery in the puffin population (van der Wal *et al.*, 2008[125], Anderson, 2021[126]).

4.5.5.5 There is therefore evidence that the management of vegetation can benefit breeding puffin and is thus an ecologically feasible compensation measure.

Wider Ecological Considerations

4.5.5.6 Invasive plant species can affect the growth and performance of a wide range of other species (e.g., vegetation or insects), which can affect the wider site ecosystem (Jones *et al.*, 2011[123]). More generally, any vegetation alterations are likely to benefit certain species whilst negatively impacting others, depending on habitat preferences. The knock-on effects of vegetation removal or habitat alteration thus need to be carefully considered.

4.5.5.7 Positive wider ecological impacts are likely to include benefits to other seabird species, for example the clearance of tree mallow aims to restore populations of cormorants, as well as cliff vegetation (van der Wal *et al.*, 2006[125]).

Timing of Delivery

4.5.5.8 As outlined in the feasibility sections below, there are established restoration and vegetation maintenance approaches, which are straightforward to implement from both a technical and legal perspective. The measure can thus be readily implemented as soon as site selection and any partnership agreements/contracts have been secured – there is thus no technical lead-in time anticipated. It should be acknowledged that this measure targets an increase in seabird productivity (i.e., numbers of chick fledged per pair). There is thus an inevitable ecological time delay between implementing the measure and additional fledged birds reaching breeding

age. For puffin it takes five years for any fledged juvenile to reach breeding age (Horswill and Robinson, 2015[12]). Whilst, as outlined above, there is no technical lead-in time for this measure to become effective, implementation is therefore recommended prior to operation to minimise or avoid a build-up of temporary compensation debt of adult birds (whilst awaiting birds to reach adulthood) during the early years of implementation.

Monitoring

4.5.5.9 As this measure targets the habitat rather than puffin directly, this measure is relatively indirect. Therefore, accurately quantifying the benefits of vegetation management to puffin adult breeding populations is likely challenging. However, quantifying the area affected by suboptimal habitat, and the potential increase in number of puffin burrows in any restored area can feasibly be estimated quantitatively. Therefore, it is likely that the success of this measure would be monitored with a combination of quantitative (e.g., ha of habitat removed, number of occupied burrows) and qualitative methods (narrative around changes in breeding populations over time). Following the initial undertaking of the management, monitoring and ongoing management would be required to ensure that the habitat remains suitable during the lifespan of the Project. Visits for vegetation removal will likely be required on a twice-yearly basis, in particular during the first five years after first clearance to ensure new seedlings are swiftly removed without having the opportunity to set to seed. This ensures the seedbank gets depleted and regrowth is minimised (van der Wal, 2006[127]).

Adaptive Management

4.5.5.10 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective.

4.5.5.11 Examples of appropriate adaptive management for seabird breeding site restoration could include i) expanding vegetation management techniques, such as manual removal, herbicide application, or controlled burning, to improve habitat quality and increase nesting space, ii) extending the restoration efforts to cover additional areas or sites to boost recolonization and expansion, and/or iii) adjusting the timing and intensity of vegetation management based on growth patterns and seasonal factors.

Feasibility

Technical Feasibility

4.5.5.12 Whilst access restrictions (both in relation to the landscape/geography, and any legal restrictions) need to be carefully considered, the actual methods of vegetation alteration are well-reported, widely used and highly feasible. For example, tree mallow can be readily cut back and removed (van der Wal, 2006[127])

4.5.5.13 The overall feasibility of this measure would be reliant on the identification of suitable colonies which would benefit from habitat management being undertaken but is not currently a pre-existing conservation management measure. It should be noted that Green Volt Offshore Wind Farm have put forward tree mallow removal as part of their suite of compensation measures, implemented through the provision of funding for the SOS Puffin programme (Green Volt, 2024[128]). Implementation of this measure by Caledonia OWF would thus depend on the identification of further sites, not covered by the SOS Puffin project, at which a need for vegetation management exists, or alternatively, a further need for funding by the SOS Puffin project towards which Caledonia OWF could contribute.

4.5.5.14 Based on qualitative assessment using expert judgement, and the successful implementation of measures for restoration or maintenance of breeding sites at puffin colonies, it is deemed technically feasible to implement this proposed measure for this project, with a high likelihood of success if implemented at appropriate sites.

Financial Feasibility

4.5.5.15 This measure can be achieved through funding contractors to undertake clearance, or through funding additional site managers. It is likely a relatively low-cost measure (dependent on geographical area) and thus financially feasible.

4.5.5.16 Investigating whether any existing projects (such as SOS Puffin; Scottish Seabird Centre, 2024[129]) require any additional resources, and funding this as (part of) the compensation measure would reducing the cost of the project compared to developing a plan and implementation from scratch.

Legal Feasibility

4.5.5.17 There is unlikely to be a legal constraint to this measure.

4.5.6 Conservation Management Funding

Introduction

4.5.6.1 Following consultation with NatureScot on 1 July 2024, an additional compensatory approach which the Applicant is keen explore is the funding of site management activities (e.g., those outlined in management plans or proposed elsewhere) that have not been realised or have been discontinued/scaled back, for example due to limited funds and/or resource. This measure could thus include the funding (and/or other forms of support) of a variety of site conservation and management activities including, but not limited to, disturbance reduction, litter removal, predator management or vegetation clearance. The opportunity and scope for such funding will be investigated as part of the site-selection for potential compensatory measures which will be carried out as part of the "next steps" of the compensation development (see Section 6). Any identified options would be consulted upon with the relevant stakeholders and could be delivered jointly or in collaboration with other developers as part of a joint, or strategic, compensation scheme.

4.5.6.2 With regards to the concept of "additionality", it is important to note that EC guidance states that, in order to ensure the overall coherence of the network, compensatory measures should be "additional" to the actions which are normal practice under the Habitats and Birds Directives.

4.5.6.3 The Applicant's understanding is that in situations where a measure or activity is listed in management plans or other proposals, or deemed of benefit but is unlikely to be commenced in the near future (or has been discontinued without plans to re-commence), a measure/activity could thus be considered outside the normal practice for the site, and thus considered "additional" by NatureScot for the purposes of compensation delivery.

4.5.6.4 The Applicant will look to identify sites (or proposed locations) where management options have been discontinued or not started and will look to consult with site managers and other stakeholders to identify any opportunities where funding could ensure these management activities are (re-)commenced.

Ecological Evidence and Wider Ecological Considerations

4.5.6.5 As this measure would consist of the funding (and/or other support) of proposed site management activities for which a need has already been identified, there will be ecological evidence for the identified threat and benefit of proposed activities. This ecological evidence will be collated from consultation with relevant site managers and experts, as well as reviews of any relevant literature. Wider ecological considerations of any management activities to be funded will also be considered. This information will be

provided to the Steering Group as part of the Implementation and Monitoring Plan, and submitted for sign-off by MD-LOT (see Section 6.8.7).

Timing of Delivery and Monitoring

4.5.6.6 Funding for proposed site management activities can be readily provided, thus there is no anticipated time delay for the implementation of this measure following the securing of this measure. Further detail regarding the anticipated implementation and monitoring of the activities following funding, or any other forms of support, will be discussed with the relevant site managers, and information provided to the Steering Group (see Section 6.8.7).

Adaptive Management

4.5.6.7 Adaptive management is discussed in further detail in Section 6.6. In short, it is a process by which existing compensation measures are adjusted, or additional measures are implemented, in order to achieve the required compensation aims in situations where the implemented measures are not sufficiently effective. Should monitoring reveal that adaptive management is required, this will be discussed with the Steering Group and the decisions/relevant actions will be submitted for review and sign off with MD-LOT.

Feasibility

Technical Feasibility

4.5.6.8 Funding of management activities is straightforward, with no further technical feasibility considerations. Should a need for support other than financial be identified, technical feasibility of such support will be provided to the Steering Group as part of the Implementation and Monitoring Plan, and submitted for sign-off by MD-LOT (see Section 6.8.7).

Financial Feasibility

4.5.6.9 Only proposed management activities which can be feasibly funded by the Applicant will be considered.

Legal Feasibility

4.5.6.10 The funding of the (re-)instating of site management activities is likely straightforward from a legal perspective. Legal considerations of a funding agreement (or any other forms of support) would be set out in collaboration with the relevant site managers upon identification of activities to be funded.

5 Preliminary Site Selection

5.1 Methodology

5.1.1.1 Preliminary site selection for the proposed compensation measures has been carried out. For each impacted species, a list of all Scottish colonies within MMFR±1SD (around land) of the array was obtained using ArcGIS.

5.1.1.2 MMFR±1SD was used in order to target colonies which have the greatest theoretical connectivity to the Proposed Development (Offshore), thus prioritising sites as close as possible to where potential impacts are occurring. Both SPA and non-SPA colonies were included in the search in order to increase the likelihood of identifying a colony within MMFR±1SD where the impacted species would benefit from compensation delivery (i.e., where threats are not already being addressed as part of existing management).

5.1.1.3 For each of those colonies, data was then collated on the current colony counts, population trend data and productivity data. The British Ornithological Trust's (BTO) SMP database (BTO, 2024[130]) was utilised to analyse population trends and identify sites with low productivity that could benefit from compensation measures. Percentage changes in population count between earliest and most recent counts were quantified, and fluctuations in population size over time assessed to identify potential sites which may benefit from compensation.

5.1.1.4 In addition, to better understand drivers of population trends and productivity at these sites, desk-based research was conducted to identify potential pressures or threats. Information of current pressures and threats at each SPA was collected from the Joint Nature Conservation Committee SPA data form (JNCC, 2022[131]) and Scottish Environment Protection Agency (SEPA) protected nature sites application (SEPA, 2024[132]). Additional desk-based research, through a literature search across publicly available online documentation, was used to identify other potential threats and pressures at the identified colonies. It should be noted that for a large number of colonies, no information on current threats could be located online, and as such, next steps in site selection (Section 6) will include local engagement with site managers, landowners or other stakeholders to identify further potential delivery sites (in addition to those presented in Section 5.2 below).

5.2 Preliminary Findings

5.2.1.1 The overarching threats and pressures found to be affecting the majority of sites within MMFR±1SD are mammalian predation and anthropogenic disturbance, however as noted previously (paragraph 5.1.1.4), further investigation, in particular consultation with local experts, is required as

part of the next steps of compensation development (see Section 6) to fill knowledge gaps due to online information being limited and/or outdated. Preliminary site selection findings, identifying preferred sites for the commencement of stakeholder and site management discussions based on publicly available information is provided in the remainder of this section.

5.2.1.2 The following number of colonies were identified within MMFR±1SD (around land) of the Proposed Development (Offshore): 112 sites for kittiwake, 13 sites for gannet, 29 sites for guillemot and 97 sites for puffin. Based on the collated information on population size, productivity and threats, presents a subset of sites deemed highest priority for further investigation during next steps of compensation measure development (with justification provided in the table).

Table 5-1: Proposed priority sites for compensation measure development.

Site	Species	Justification
Brough of Birsay	Kittiwake, Guillemot, Puffin	Large declines for these species. Whilst this site is a part of the Orkney Wildlife Project for removal of stoat, further actions to support seabirds, e.g., in relation to avian predation and potential human disturbance should be explored.
Copinsay SPA	Kittiwake, Guillemot	Large declines and evidence of breeding failure. Tourism and water-based recreational activities known to occur at/near the site, thus assessment of human disturbance threat needed.
Deerness	Kittiwake	Potential for avian predator impacts. Whilst this site is a part of the Orkney Wildlife Project for removal of stoat, further actions to support seabirds, e.g., in relation to avian predation and potential human disturbance should be explored.
East Caithness Coast SPA	Kittiwake, Guillemot, Puffin	Included for further consideration of threats which can be addressed given the predicted impact by Caledonia OWF on this site. There is known fishing pressure near this site, thus a potential focal region of interest for bycatch mitigation work.
Fair Isle SPA	Kittiwake, Gannet, Puffin	Predation from both large gulls and rats are known threat at this site. While also being in the top 25 sites for vertebrate eradication. There is known fishing pressure near this site, thus also a potential focal region of interest for bycatch mitigation work.
Forth Islands SPA	Kittiwake, Puffin	SOS Puffin project is operating in this location – additional support to reduce pressures on puffin as well as kittiwake should be considered here.
Foula SPA	Kittiwake, Puffin	Predation by avian and mammalian predators raised as key threat.

Site	Species	Justification
Fowlsheugh SPA	Kittiwake, Puffin	Recreational disturbance raised as potential threats for kittiwake and puffin at this site.
Hermaness, Saxa Vord and Valla Field SPA	Gannet	Potential for visitor disturbance in the breeding season for gannet.
Marwick Head SPA	Guillemot, Gannet	Population declines recorded for guillemot. A part of the Orkney Native Wildlife Project to address stoat predation, but other seabird support could be beneficial.
North Rona and Sula Sgier SPA	Puffin	Recreational disturbance and predation recorded to affect puffin at this site.
Noss SPA	Kittiwake, Gannet, Puffin	Has a management plan from 2014-2024, so support past 2024 as part of next management cycle could be explored in light of large seabird declines.
Papa Westray (North Hill and Holm) SPA	Guillemot	Severe decline in both productivity and population at this site.
Sumburgh Head SPA	Puffin	Number of puffin have significantly declined andpoor productivity recorded. Predation and recreational disturbance highlighted as threats.
Troup, Pennan and Lion's Heads SPA	Kittiwake, Gannet, Guillemot, Puffin	Included for further consideration of threats which can be addressed given the predicted impact by Caledonia OWF on this site. There is known fishing pressure near this site, thus a potential focal region of interest for bycatch mitigation work.
West Westray SPA	Kittiwake, Guillemot, Puffin	This was once a large population, but population and productivity declines are observed. Data on current threat and pressure indicate climate change and fishing pressure but further minor threats, such as predation and disturbance should be investigated.

6 Next Steps

6.1 Overview

6.1.1.1 The next steps to progress the proposed compensation measures are outlined in the sections below, with roadmaps for delivery provided at the end of the section. Next steps will be progressed post-submission and throughout the determination stage of the application process wherever possible, and as soon as feasible. In particular, steering group formation, site selection (including partnership formation and securing of measures through agreements/contracts) and technical design planning will continue to be progressed immediately following submission of the consent application. It should be noted however that consideration and conclusions by Scottish Ministers are needed to specify the scale of compensation required before measures can be fully progressed and finalised.

6.2 Consultation and Decision-making

6.2.1.1 The Applicant has undertaken consultation on the compensation development with NatureScot and RSPB at various points throughout preparation for submission.

6.2.1.2 Consultation with relevant stakeholders, including NatureScot and RSPB, will continue throughout the post-submission period, as compensation measures are further refined and developed. Post-submission, the Applicant plans to form a Steering Group to advise and assist on the implementation and monitoring of the compensation measures. Invited members will consist of representatives of the Applicant, NatureScot, Marine Directorate - Licensing Operations Team (MD-LOT), RSPB, local wildlife trusts, local authorities and other stakeholders relevant to each of the proposed measures. Details of Steering Group scope, membership and responsibilities will be set out in the IMP (for further detail, see Application Document 15, Appendix 15-4: Caledonia North Outline Implementation and Monitoring Plan). Consultation, through the proposed Steering Group, is to continue throughout the pre-construction and construction phases.

6.3 Site Selection

6.3.1.1 As outlined in Section 5, the Applicant has commenced the site selection process by identifying, for those species covered by this compensation plan, colonies within foraging range (MMFR±1SD), collating information on population trends, threats and wider ecological factors, and identifying priority sites for the commencement of stakeholder and site manager discussions and further development of compensation plans..

6.3.1.2 Next steps will consist of stakeholder discussions and any additional desk-based research to finalise site selection to further establish at which sites the species of concern are impacted by the threats and pressures detailed in the species sections above (e.g., predation, human disturbance and bycatch). Liaising with landowners and site managers (where relevant) will be a key part in understanding feasibility of compensation at identified sites, in particular for colonies for which little to no information on current threats to the impacted species could be located online as part of preliminary site selection (Section 5). Where deemed necessary, site investigation visits may be completed to collate further information on breeding, habitat suitability and/or threats relevant to compensation measure development (e.g., signs of predation and disturbance).

6.3.1.3 Technical design considerations (Section 6.4) will also be factored into the site selection process, based on the fact that access, geography and other environmental factors will affect the technical feasibility of compensation delivery at identified sites.

6.3.1.4 Once potentially feasible sites have been identified, sites for delivery are to be secured though a process of:

- Further liaison with landowners and local stakeholders to establish agreements and/or collaborations for compensation implementation, setting out Memoranda of Understanding (MOU);
- Site visits (where required) to fill any knowledge/evidence gaps;
- Formalising of landowner agreements/memorandums of understanding/exclusivity agreements; and
- Securing any access rights, land acquisition and other legal/licensing requirements where needed.

6.3.1.5 Should no suitable sites for compensation delivery be identified within MMFR±1SD of Caledonia North, site selection will be broadened to a wider geographical area.

6.4 Technical Design

6.4.1.1 For each compensation measure, a design plan is to be developed as part of the implementation planning for the measure, and captured within the IMP (Application Document 15, Appendix 15-4: Caledonia North Outline Implementation and Monitoring Plan). Technical design of compensation measures will be informed by existing literature and expertise. Non-ornithological expertise (e.g., eradication experts, engineers) will be consulted upon as/where need arises, and appropriate teams for the delivery of each measure secured and specified in the IMP.

6.4.1.2 The technical considerations for the practical delivery will differ between compensation measures:

- Disturbance reduction
    - Depending on approach used;
        - Text and design of signs and other outreach materials;
        - Mapping of path diversions/closures or temporary fencing; and
        - Definition of warden duties and responsibilities.
    - Implementation schedule (considering disturbance-sensitive periods) and locations at site; and
    - Health and Safety.
- Predator eradication
    - Bait/rodenticide/trap specifications and placement (density and locations);
    - Geographical/access considerations;
    - Eradication schedule, including rodenticide refill plans if refillable bait stations are used;
    - Carcass disposal plans;
    - Management of risk to non-target species;
    - Biosecurity/incursion response plans; and
    - Health and Safety, considering staff, community and visitors, and including rodenticide and carcass Health and Safety plans (storage, transport etc.).
- Non-lethal avian predator control
    - Design of deterrent method, depending on approach (most suitable approach for benefiting cliff-nesting species likely to consist of auditory options or human disturbance, but to be confirmed with site-specific research);
        - Auditory deterrent information, including specifications of any auditory deterrents to be purchased and/or details, including branding and volume, of electrical equipment used for broadcasting auditory deterrents or distress calls;
        - Methodology for human disturbance of avian predators by (e.g., wardens);
        - Design specifications of humming line/scarer rope or other visual deterrents; and
        - Scarecrow design.

- Location and/or spacing of deterrent measures at breeding site;
- Seasonal implementation schedule in the context of predation-sensitive period;
- Management of risk to non-target species; and
- Health and Safety.

- Bycatch mitigation
  - Bycatch monitoring programme design, including:
    - recording of bycatch of target species and other species;
    - specifications of electronic monitoring equipment (if used);
    - recording of other explanatory variables (e.g., sea state, geographical location, vessel type, net/line characteristics, bait type); and
    - monitoring frequency, duration and number of vessels.
  - Mitigation trial design, including:
    - Specifications of bycatch reduction technology to be implemented; and
    - Implementation sample size (number of vessels) and duration, including information on control data for statistical analysis.
  - Location(s) for monitoring and/or trials; and
  - Health and Safety.
- Breeding site restoration and maintenance
  - Vegetation management approach and necessary tools/equipment (e.g., for cutting, bashing, herbicide application, digging);
  - Implementation schedule, taking into consideration (re-)growth patterns, seasonality (e.g., seed-release period) and multi-year seedbank depletion plan;
  - Details of locations at which management is to take place within each site; and
  - Health and Safety.

6.5 Scale of Compensation

6.5.1.1 Compensation ratios and predicted scale of compensation delivery will be quantified based on predicted impacts (Section 2) and technical design information (Section 6.4) and site details (Section 6.3). Ratios and scale of compensation will be consulted upon with the Steering Group and agreed

plans captured in the IMP (Application Document 15, Appendix 15-4: Caledonia North Outline Implementation and Monitoring Plan).

6.6 Adaptive Management Planning

6.6.1.1 Adaptive management is a process which uses the results of monitoring of compensation measures to implement adjustments to compensation measures, or implementation of additional measures, in order to achieve the required compensation aims as captured in the consent conditions and set out in the IMP. It is essential in order to manage uncertainty in the delivery of appropriate compensation, to help reduce the risk of compensation not delivering the required outcomes, and to ensure the long-term resilience of the compensation delivery.

6.6.1.2 If post-implementation monitoring reveals that the implemented compensation measures are unsuccessful, or insufficiently effective at delivering the consented compensation objectives, a corrective process will be triggered. Adaptive management is a post-consent process which combines monitoring with adjustments to existing measures, or implementation of additional measures, in order to achieve the required compensation aims.

6.6.1.3 An additional goal of monitoring and adaptive management is to review, and if necessary adjust, the required outcomes in light of environmental changes occurring that are unpredictable and outwith the control of the compensation measures (e.g., effects of climate change, further outbreaks of Highly Pathogenic Avian Influenza (HPAI)).

6.6.1.4 The course of action for adaptive management is based on which issues are identified during monitoring, and will be decided upon in consultation with the compensation Steering Group (see Section 6.2).

6.6.1.5 Adaptive management plans will be detailed in the IMPs for the compensation measures. The adaptive management plans will outline the "trigger points" at which the adaptive management process will be triggered, and the proposed framework and governance for the adaptive management process.

6.7 Other

6.7.1.1 Next steps will include the iterative updating of the Outline IMP submitted at application, including the drafting of species- or measure-specific IMPs, which will include proposed plans for the implementation and monitoring of the compensation measures, and further development of adaptive management plans. The IMP will include a programme for compensation delivery in the context of the timelines for construction and operation.

6.7.1.2 Detailed costings for the design, implementation and monitoring of the compensation measures are to be developed and captured within the IMP.

6.7.1.3 The Applicant will evaluate the need for undertaking additional surveys to improve understanding of the limiting factors faced by the impacted species, in order to improve understanding of the feasibility of shortlisted compensation measures.

6.7.1.4 As noted in paragraph 4.1.1.3 and as discussed in stakeholder consultation on 1 July 2024, the Applicant agrees with NatureScot that a flexible and pragmatic approach to compensation is beneficial. Therefore, if opportunities for compensation measures, other than those presented in this document, are identified as part of the next steps presented here, the Applicant may further develop such additional or alternative options to ensure the most feasible and beneficial compensation measures are used. This process would be consulted and reported upon as part of the IMP development process (Application Document 15, Appendix 15-4: Caledonia North Outline Implementation and Monitoring Plan).

6.8 Roadmaps for Compensation Measure Delivery

6.8.1 Overview

6.8.1.1 The sections below set out proposed roadmaps for delivery of the proposed measures. These are subject to agreement and refinement in collaboration with the compensation Steering Group (for details on the proposed Steering Group membership and responsibilities, see Application Document 15, Appendix 15-4: Caledonia North Outline Implementation and Monitoring Plan).

6.8.1.2 During the first year after the creation of the Steering Group, the shortlisted compensation measures will be reviewed. It will be decided in consultation with the Steering Group which compensation options should be progressed. Any changes will be recorded within the IMP. Additionally, as discussed in Section 1.4, should the Applicant opt to contribute to a strategic compensation fund as and when a viable pathway comes available, such strategic measures may be used in addition to, instead of, or to provide adaptive management for the proposed developer-led compensation measures. Therefore, it is noted that the compensation roadmaps below are subject to change.

6.8.1.3 Indicative delivery timescales are provided below in Table 6-1. Further details haven been provided for each of the following shortlisted measures in the relevant sections below:

- Section 6.8.2: Disturbance reduction;
- Section 6.8.3: Predator eradication;
- Section 6.8.4: Non-lethal avian predator control;
- Section 6.8.5: Bycatch mitigation;
- Section 6.8.6: Breeding site restoration and maintenance; and
- Section 6.8.7: Conservation management funding.

Table 6-1: Indicative compensatory delivery timescales following submission of the consent application.

Activity	Year 1	Year 2	Year 3	Year 4 onwards
Creation of Steering Group				
Engagement with the Steering Group				
Review of compensation measures*				
Identification of suitable sites (short list)				
Partnership formation with managers/ landowners, securing of measures through contracts/agreements				
Development of the IMP				
Finalisation of compensation design				
Finalisation of compensation scales/ ratios				
Baseline survey (if required)				
Submission of the IMP				
Monitoring				
Implementation**				
Reporting				
Adaptive management (if required)				
* Decision on which of the shortlisted compensation measures will be progressed ** Implementation is dependent on complexity of technical design and legal finalisation – Commencement from Year 3 onwards				

6.8.2 Disturbance Reduction

Step 1

6.8.2.1 During the initial stages of development of the disturbance reduction compensation measure post-submission, the Applicant will regularly engage with an appointed Steering Group to complete the following:

- Defining location(s) for implementation through a combination of;
    - Collating additional (local) evidence of disturbance reduction to confirm sites where seabirds would benefit from disturbance reduction;
    - The finalisation of the short list of sites for compensation delivery;
    - Engagement with site managers and landowners to discuss site suitability and establish partnerships; and
    - Engagement with relevant stakeholders, for example NatureScot and the RSPB.
- Secure contracts;
    - Confirm partnership agreements and contracts with site managers/landowners.
- Identification of disturbance reduction options to implement;
    - Undertake discussions and workshops with partners and stakeholders to select the disturbance reduction measure(s) most suitable for implementation, e.g., introduction of wardens, signage, path diversions and path maintenance; and
    - Finalise design of disturbance reduction measure – e.g., signage design, mapping of path diversion, prioritisation/scheduling of path maintenance, definition of responsibilities and contracting for warden(s), schedule for outreach activities.
- Identify the scale of compensation;
    - Confirm the number of sites where disturbance reduction can and/or will be implemented; and
    - Estimate the number of breeding pairs likely to benefit from the proposed disturbance reduction measures and quantify predicted scale of benefits.
- Identify appropriate compensation ratios based on;
    - The location of the sites in relation to the impacted colony/colonies and wider protected site network;
    - Confidence in the effectiveness of the disturbance reduction measure(s) being implemented;

- Other compensation measures taken forward, and the scale of delivery of those measures; and
- Any delays in compensation delivery (i.e., compensation debt due to ecological delay of fledglings reaching adulthood).

- Development of the IMP, including details on the adaptive management process; and
  - As per Application Document 15, Appendix 15-4: Caledonia North Outline Implementation and Monitoring Plan.
- Submission of the IMP.

Step 2

6.8.2.2 Once the IMP is agreed with the Steering Group, and submitted and signed off by MD-LOT, disturbance reduction measures will be implemented at the agreed sites. The delivery and monitoring will follow the plans set out in the IMP as completed during Step 1 above.

Step 3

6.8.2.3 Discussions and collaboration with the Steering Group will continue throughout the implementation and monitoring of the disturbance reduction compensation measure. Annual reports will be submitted as agreed within the IMP.

6.8.2.4 Should monitoring reveal that adaptive management is required, this will be discussed with the Steering Group, and the decisions/relevant actions submitted for review and sign off with the MD-LOT.

6.8.3 Predator Eradication

Step 1

6.8.3.1 During the initial stages of development of the predator eradication compensation measure post-submission, the Applicant will regularly engage with an appointed Steering Group to complete the following:

- Defining location(s) for implementation through a combination of;
  - Identification of sites with mammalian predators where seabirds would benefit from predator control/eradication, and where control/eradication can be feasibly achieved for geographical and logistical reasons (e.g., islands);
  - The finalisation of the short list of sites for compensation delivery;
  - Engagement with site managers and landowners to discuss site suitability and establish partnerships; and

  - Engagement with relevant stakeholders, for example the RSPB and Biosecurity for Life.

- Secure contracts;
  - Confirm partnership agreements and contracts with site managers/landowners; (as required);
  - Identify eradication contractors and secure contracts; and
  - Apply for any necessary licences and complete any required assessments (e.g., EIA).
- Predator eradication and/or control feasibility;
  - Identification of relevant personnel to undertake the control and/or eradication measures – i.e., eradication contractors;
  - Collaborate with eradication contractors to develop technical details of eradication programme, e.g., whether lethal control (e.g., the use of rodenticide or other poison bait) or non-lethal control (e.g., the use of exclusion fencing) will be taken forward, materials used, spacing of bait stations/traps etc.;
  - Identification of relevant biosecurity measures and development of biosecurity plans;
  - Undertake full site feasibility assessments as per the Biosecurity for Life best practice toolkits; and
  - Engagement with the general public, likely appropriate methods consist of online outreach in combination with drop-in workshops to discuss any potential queries/concerns.
- Identify the scale of compensation;
  - Confirm the number of sites where mammalian predator control/eradication can and/or will be implemented; and
  - Estimate the number of breeding pairs likely to benefit from the proposed control/eradication programme and quantify predicted scale of benefits.
- Identify appropriate compensation ratios based on;
  - The location of the sites in relation to the impacted colony/colonies and wider protected site network;
  - Confidence in the effectiveness of mammalian; control/eradication being implemented
  - Other compensation measures taken forward, and the scale of delivery of those measures; and
  - Any delays in compensation delivery (e.g., compensation debt due to technical delay of eradication programme development, or ecological delay of fledglings reaching adulthood).
- Development of the IMP; and

- As per Application Document 15, Appendix 15-4: Caledonia North Outline Implementation and Monitoring Plan.

- Submission of the IMP.

Step 2

6.8.3.2 Once the IMP is agreed with the Steering Group, and submitted and signed off by MD-LOT, mammalian predator control/eradication will be implemented at the agreed sites. The delivery and monitoring will follow the plans set out in the IMP as completed during Step 1 above.

6.8.3.3 If a full eradication is chosen to be taken forward, monitoring will continue for a minimum of two years following eradication to affirm predator free status and confirm that the eradication was successful.

Step 3

6.8.3.4 Discussions and collaboration with the Steering Group will continue throughout the implementation and monitoring of the mammalian predator control and/or eradication compensation measure. Annual reports will be submitted as agreed within the IMP.

6.8.3.5 Should monitoring reveal that adaptive management is required, this will be discussed with the Steering Group, and the decisions/relevant actions submitted for review and sign off with MD-LOT.

6.8.4 Non-lethal Avian Predator Control

Step 1

6.8.4.1 During the initial stages of development of the avian predator control compensation measure post-submission, the Applicant will regularly engage with an appointed Steering Group to complete the following:

- Defining location(s) for implementation through a combination of;
  - Collating additional (local) evidence of avian predation to confirm sites where guillemot and puffin would benefit from avian control;
  - The finalisation of the short list of sites for compensation delivery;
  - Engagement with site managers and landowners to discuss site suitability and establish partnerships; and
  - Engagement with relevant stakeholders, for example NatureScot and RSPB.
- Identification on avian control technique(s);

  - Identify, and discuss with steering group, appropriate avian control technique(s) and implementation plan. Workshops to select optimal methods may be deemed necessary or beneficial; and
  - Review potential negative impacts on target and non-target species, and adjust site selection and implementation plan based on review findings.
- Secure contracts;
  - Confirm partnership agreements and contracts with site managers/landowners;
  - Identify organisation responsible for implementation (site managers or independent contractor) and secure contracts; and
  - Apply for the necessary licences and complete any required assessments (e.g., EIA).
- Identify the scale of compensation;
  - Confirm the number of site where avian predator control will be implemented; and
  - Estimate the number of breeding pairs likely to benefit from the proposed disturbance reduction measures and quantify predicted scale of benefits.
- Identify appropriate compensation ratios based on;
  - The location of the sites in relation to the impacted colony/colonies and wider protected site network;
  - Confidence in the effectiveness of avian control measures being implemented;
  - Other compensation measures taken forward, and the scale of delivery of those measures; and
  - Any delays in compensation delivery (i.e., compensation debt due to ecological delay of fledglings reaching adulthood).
- Development of the IMP; and
  - As per Application Document 15, Appendix 15-4: Caledonia North Outline Implementation and Monitoring Plan.
- Submission of the IMP.

Step 2

6.8.4.2 Once the IMP is agreed with the Steering Group, and submitted and signed off by MD-LOT, avian predator control will be implemented at the agreed sites. The delivery and monitoring will follow the plans set out in the IMP as completed during Step 1 above.

Step 3

6.8.4.3 Discussions will continue with the Steering Group will continue throughout the implementation and monitoring of the avian predator control compensation measure. Annual reports will be submitted as agreed within the IMP.

6.8.4.4 Should monitoring reveal that adaptive management is required, this will be discussed with the Steering Group and the decisions/relevant actions will be submitted for review and sign off with MD-LOT.

6.8.5 Bycatch Mitigation

Step 1

6.8.5.1 During the initial stages of development of the bycatch mitigation compensation measure post-submission, the Applicant will regularly engage with an appointed Steering Group to complete the following:

- Defining location(s) for implementation through a combination of;
  - Engagement with commercial fisheries representatives;
  - Identification of locations of bycatch risk (overlap between fisheries and seabird (guillemot and gannet) distributions);
  - Identification of, and engagement with, relevant bycatch experts (for example Defra, the UK Bycatch Monitoring Programme Manager and the RSPB Bycatch Programme Manager); and
  - The finalisation of the short list of sites for compensation delivery.
- Form collaborations with selected fishers and relevant stakeholders;
  - Confirm partnership agreements and contracts with relevant organisations and fishers.
- Identification of potential bycatch mitigation options to trial and/or implement;
  - Undertake discussions and workshops with bycatch mitigation experts.
- Identify the scale of compensation;
  - Estimate the number of birds that could be prevented from being bycaught (per unit of fishing effort) at proposed implementation sites, based on published literature on bycatch rates and estimates of effectiveness of mitigation measures; and
  - Confirm the number of fishers to complete the trialling and/or implementation of the identified bycatch reduction techniques.

- Identify appropriate compensation ratios based on;
    - The location of the fishery in relation to the impacted colony/colonies and wider protected site network;
    - Confidence in the effectiveness of the bycatch reduction technique being trialled/implemented;
    - Other compensation measures taken forward, and the scale of delivery of those measures;
    - Any delays in compensation delivery (e.g., compensation debt due to technical lead-in time, for example if further programme development or research is needed before bycatch reduction measure can be trialled/implemented).
- Development of the IMP; and
    - As per Application Document 15, Appendix 15-4: Caledonia North Outline Implementation and Monitoring Plan.
- Submission of the IMP.

Step 2

6.8.5.2 Once the IMP is agreed with the Steering Group, and submitted and signed off by MD-LOT, the trialling and/or implementation of the agreed bycatch reduction techniques will commence. The delivery and monitoring will follow that as discussed and agreed in the IMP as completed during Step 1 above.

Step 3

6.8.5.3 Discussions and collaboration with the Steering Group will continue throughout the implementation and monitoring of the bycatch reduction compensation measure. Annual reports will be submitted as agreed within the IMP.

6.8.5.4 Should monitoring reveal that adaptive management is required, this will be discussed with the Steering Group and the decisions/relevant actions will be submitted for review and sign off with MD-LOT.

6.8.6 Breeding Site Restoration and Maintenance

Step 1

6.8.6.1 During the initial stages of development of the breeding site restoration compensation measure post-submission, the Applicant will regularly engage with an appointed Steering Group to complete the following:

- Identification of location(s) for implementation through a combination of;
    - Identification of sites where puffins would benefit from breeding site restoration through consultation of local experts and/or site managers;
    - The finalisation of the short list of sites for compensation delivery;
    - Engagement with site managers and landowners to confirm site suitability and establish partnerships; and
    - Engagement with relevant stakeholders, for example NatureScot and RSPB.
- Secure contracts;
    - Confirm partnership agreements and, if necessary, contracts with site managers/landowners.
- Identification of relevant restoration or maintenance techniques;
    - Identify optimal vegetation management approach based on existing guidance and discussions with (local) experts;
    - Discuss and agree proposed management technique with Steering Group.
- Identify the scale of compensation;
    - Confirm the number of sites and size of area where restoration will be completed;
    - Estimate the amount of additional nest site availability created following vegetation management, and quantify number of recruits into adult population from restored/created sites to quantify predicted scale of benefits.
- Identify appropriate compensation ratios based on;
    - The location of the sites in relation to the impacted colony and wider protected site network;
    - Confidence in the effectiveness of the site restoration;
    - Other compensation measures taken forward, and the scale of delivery of those measures; and

- Any delays in compensation delivery (i.e., compensation debt due to ecological delay between habitat being restored to provide additional nesting space, and fledglings from those nests reaching adulthood).

- Development of the IMP; and
  - As per Application Document 15, Appendix 15-4: Caledonia North Outline Implementation and Monitoring Plan.
- Submission of the IMP.

Step 2

6.8.6.2 Once the IMP isis agreed with the Steering Group, and submitted and signed off by MD-LOT, habitat restoration will be undertaken at the planned sites. The delivery and monitoring will follow the plans set out and agreed in the IMP as completed during Step 1 above.

Step 3

6.8.6.3 Discussions and collaboration with the Steering Group will continue throughout the implementation and monitoring of the restoration of breeding sites compensation measure. Annual reports will be submitted as agreed within the IMP.

6.8.6.4 Should monitoring reveal that adaptive management is required, this will be discussed with the Steering Group and the decisions/relevant actions will be submitted for review and sign off with MD-LOT.

6.8.7 Conservation Management Funding

Step 1

6.8.7.1 Throughout consultation with statutory bodies and Steering Groups (as part of the site selection and development of the compensation measures outlined above), the Applicant will be open to discussing and researching the potential benefits of any additional/alternative management activities to benefit the impacted species. The Applicant will thenthen further develop plans to fund or support the activity as part of the suite of compensation measures for the projects. The measure will be progressed following the steps outlined below:

- Identification of management activities to fund/support;
  - Discuss, with local stakeholders or site managers, desired conservation or management activities which are not planned to be implemented or due to be discontinued;
  - Discuss level of support needed, including extent and duration of funding needs or other forms of required support; and

  - Define site(s) for implementation in collaboration with local stakeholders and site managers.
- Secure contracts;
  - Confirm partnership agreements and contracts with site managers/landowners.
- Form Steering Group;
  - When decision is made to progress conservation management funding as part of suite of compensation measures, set up Steering Group for this measure.
- Identify scale of compensation
  - Estimate number of breeding pairs (per species) likely to benefit from the proposed disturbance reduction measure and quantify predicted scale of benefits
- Development of the IMP, including details on the adaptive management process
  - As per Application Document 15, Appendix 15-4: Caledonia North Outline Implementation and Monitoring Plan
- Submission of the IMP.

Step 2

6.8.7.2 Once the IMP is agreed with the Steering Group, and submitted and signed off by MD-LOT, conservation management funding (or alternative conservation management support) will be provided at the proposed sites. The delivery and monitoring will follow the plans set out and agreed in the IMP as completed during Step 1 above.

Step 3

6.8.7.3 Discussions and collaboration with the Steering Group will continue throughout the implementation and monitoring of the compensation measure where required. Annual reports will be submitted as agreed within the IMP.

6.8.7.4 Should monitoring reveal that adaptive management is required, this will be discussed with the Steering Group and the decisions/relevant actions will be submitted for review and sign off with MD-LOT.

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