MUIR MHÒR
OFFSHORE WIND FARM

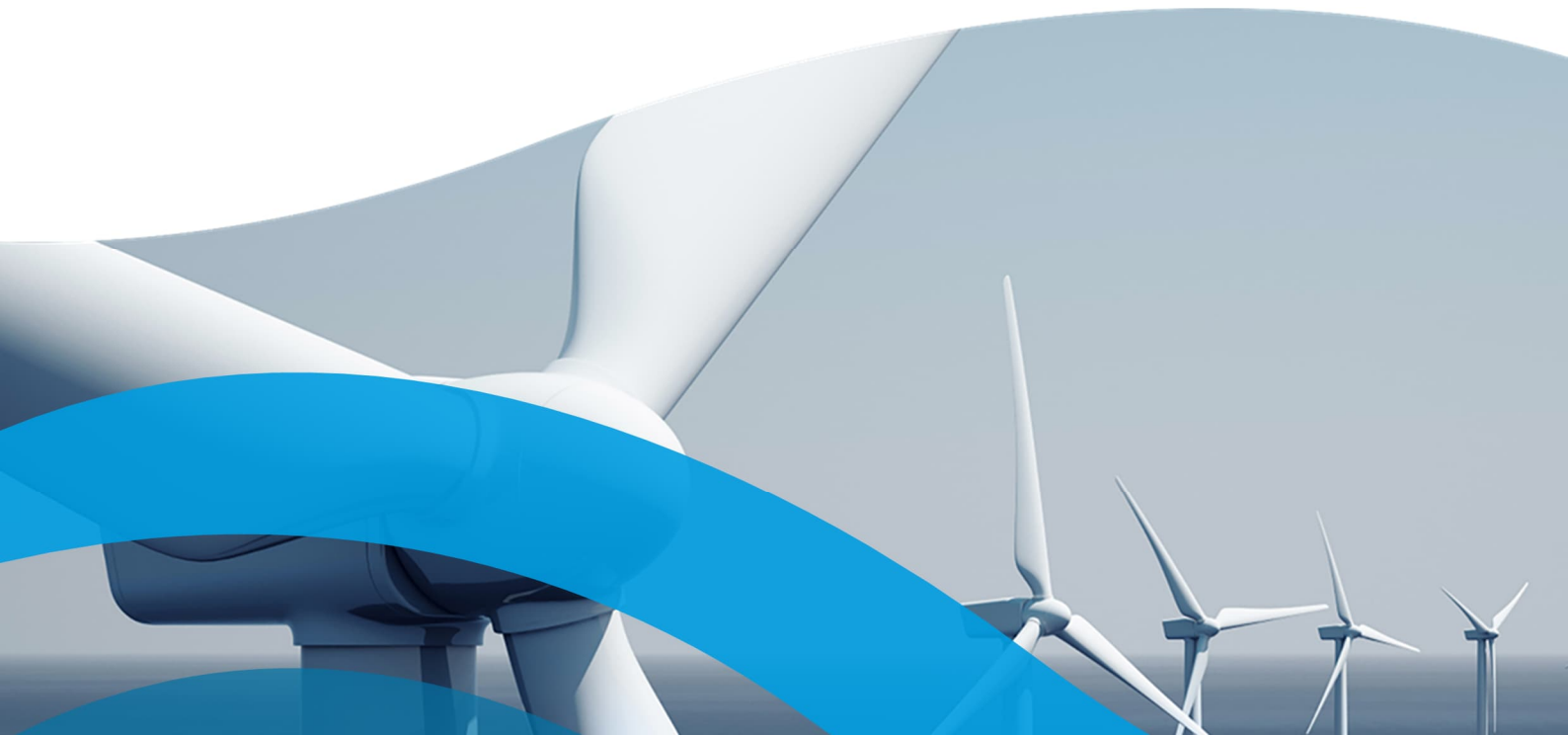
A joint venture between Fred. Olsen Seawind & Vattenfall

Additional Information Report

Muir Mhòr Offshore Wind Farm

Additional Information Report

Chapter 4: Offshore and Intertidal Ornithology Compensation



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Glossary

Term	Definition
Adaptive Management	Approach for adjusting measures based on monitoring results.
Applicant	Muir Mhòr Offshore Wind Farm Limited.
Biosecurity	Measures to prevent introduction or spread of invasive species or pathogens.
Biosecurity for LIFE	UK project for invasive species prevention on seabird islands.
Disturbance Reduction	Compensation measure aimed at reducing human disturbance to seabirds.
Predator control	Management actions to reduce or eliminate predators impacting seabird colonies
Project	Muir Mhòr Offshore Wind Farm – comprises the wind farm and all associated offshore and onshore components.
Proposed Development	The offshore Muir Mhòr Offshore Wind Farm project elements to which this Offshore EIA Report relates.
SeabORD	Seabird Offshore Renewable Development assessment tool.

Acronyms and Abbreviations

Term	Definition
AEoI	Adverse Effect on Integrity
AI	Artificial Intelligence
AIR	Additional Information Report
ANS	Artificial Nesting Structure
CE	Conservation Education
EDRR	Early Detection and Rapid Response
EE	Environmental Education
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
MRF	Marine Recovery Fund
MD-LOT	Marine Directorate– Licensing Operations Team
MoU	Memorandum of Understanding
NDA	Non-Disclosure Agreement
NS	NatureScot
NTS	National Trust for Scotland
INNS	Invasive Non-Native Species
OWF	Offshore Wind Farm
RIAA	Report to Inform Appropriate Assessment
SISI	Scottish Invasive Species Initiative
SMP	Sectoral Marine Plan
SPA	Special Protection Areas
SSC	Scottish Seabird Centre
SSSI	Sites of Special Scientific Interest
UK	United Kingdom

4. OFFSHORE AND INTERTIDAL ORNITHOLOGY COMPENSATION

4.1. INTRODUCTION

4.1.1. This Additional Information Report (AIR) relating to compensatory measures has been prepared in response to the recent Request for Information (RFI) and reflects the outcomes of subsequent updates to the ecological assessments for the Muir Mhòr Offshore Wind Farm.

4.1.2. This report forms part of the AIR and addresses advice from MD-LOT, including input from NatureScot (NS) and the Royal Society for the Protection of Birds (RSPB) Scotland on the shadow derogation case. It is not an update to the compensation case, which will be provided to Scottish Ministers in a separate submission once they have concluded on their Appropriate Assessment. We have considered NS's emphasis on ecological feasibility and their call for greater confidence in the proposed approach. It provides a transparent, evidence-based rationale for measures that are proportionate, targeted, and aligned with policy and regulatory expectations, demonstrating progress in developing a robust compensation strategy.

4.1.3. Since the application was submitted in November 2024, discussions with the Scottish Seabird Centre (SSC) and the National Trust for Scotland (NTS) have progressed, and agreements are now being finalised. However, factors beyond the control of the Applicant and these organisations, primarily the timing breeding bird obligations during the summer, have resulted in this addendum being more high-level than originally intended. Some methodologies and sites remain under review and will be incorporated into the final compensation package.

4.1.4. This addendum outlines the current plans for developing and implementing the proposed compensation measures: disturbance reduction with SSC and predator control with NTS.

4.2. COMPENSATION SUBMISSIONS

4.2.1. The application submitted to the Marine Directorate Licensing Operations Team (MD-LOT) in November 2024 included compensation documents detailing the proposed compensation measures set forth by the Applicant. Table 1 provides an overview of the compensation measures originally proposed and their associated documents.

Table 4.1 Compensation Documents – November 2024

Document Name	Document Number	Document Link
Habitats Regulations Appraisal Derogation Case	MMH-GBE-A004-ENV-0006-601	https://muirmhor.co.uk/wp-content/uploads/2024/12/MMH-GBE-A004-ENV-0006-601-Muir-Mhor-Derogation-Case.pdf
Derogation Case Appendix A: Ornithological Compensation Plan	MMH-GBE-A004-ENV-0006-602	https://muirmhor.co.uk/wp-content/uploads/2024/12/MMH-GBE-A004-ENV-0006-602-Derogation-Case-Appendix-A-Ornithological-Compensation-Measures.pdf
Derogation Case Appendix B: Artificial Nesting Structures for Kittiwake Evidence and Roadmap	MMH-GBE-A004-ENV-0006-603	https://muirmhor.co.uk/wp-content/uploads/2024/12/MMH-GBE-A004-ENV-0006-603-Derogation-Case-Appendix-B-Artificial-Nesting-Structures-for-Kittiwake-Evidence-and-Roadmap.pdf
Derogation Case Appendix C: Predator Control Evidence and Roadmap	MMH-GBE-A004-ENV-0006-604	https://muirmhor.co.uk/wp-content/uploads/2024/12/MMH-GBE-A004-ENV-0006-604-Derogation-Case-Appendix-C-Predator-Control-Evidence-and-Roadmap.pdf
Derogation Case Appendix D: Disturbance Reduction Evidence and Roadmap	MMH-GBE-A004-ENV-0006-605	https://muirmhor.co.uk/wp-content/uploads/2024/12/MMH-GBE-A004-ENV-0006-605-Derogation-Case-Appendix-D-Disturbance-Reduction-Evidence-and-Roadmap.pdf
Derogation Case Appendix E: Compensation Measures: Site Investigation Report	MMH-GBE-A004-ENV-0006-607	https://muirmhor.co.uk/wp-content/uploads/2024/12/MMH-GBE-A004-ENV-0006-607-Derogation-Case-Appendix-E-Compensation-Site-Investigation-Report.pdf
Derogation Case Appendix F: Compensatory Measures: Environmental Impact Assessment Report	MMH-GBE-A004-ENV-0006-609	https://muirmhor.co.uk/wp-content/uploads/2024/12/MMH-GBE-A004-ENV-0006-609-Derogation-Case-Appendix-F-Compensation-Measures-Environmental-Impact-Assessment-Report.pdf
Derogation Case Appendix G: Compensatory Measures: No Likely Significant Effects Report	MMH-GBE-A004-ENV-0006-608	https://muirmhor.co.uk/wp-content/uploads/2024/12/MMH-GBE-A004-ENV-0006-608-Derogation-Case-Appendix-G-No-Likely-Significant-Effects-Report.pdf

4.2.2. This approach consists of two further stages:

- **Initial AIR** - This AIR addresses as many concerns from MD-LOT, NatureScot, and RSPB as possible and provides information with sufficient notice to provide confidence in the measure where possible; and
- **Full Compensation Package -** A comprehensive compensation package will be submitted at a later stage, once the competent authority has completed its Appropriate Assessment. This package will include additional details on the proposed measures as discussions and agreements with delivery partners as the measures progress.

4.2.3. Any information or evidence that is currently incomplete or could be improved within this AIR will be updated and included before the full compensation package is submitted to the competent authority. See the for more details.

SUMMARY OF CONSULTATION

4.2.4. Effective stakeholder engagement has been a central component of the assessment and compensation planning process. This section summarises the consultation activities

undertaken post-submission (Table 4.2), including addressing consultee responses, and outlines how feedback from statutory bodies, non-governmental organisations, and other stakeholders has informed the compensation proposals.

4.2.5. Key concerns raised during consultation centred on the adequacy and evidential basis of the proposed measures to compensate for predicted impacts on seabird populations. While there was broad agreement that the proposed measures have potential, stakeholders sought greater clarity on long-term viability, and legal deliverability, particularly having regard to access rights, land use, and societal trends. NatureScot advised that there is currently insufficient information to provide confidence that the measures proposed are likely to deliver effective compensation. RSPB Scotland clarified that, while the proposed approaches may be relevant at a project level, they have not agreed to the specific measures, their timing, or their locations.

4.2.6. The potential for collaboration with organisations such as SSC and NTS was welcomed, but it was noted by both NS and the RSPB that further work is required to demonstrate how such initiatives could deliver compensation that meets the requirements of the Habitats Regulations. Further feedback highlighted the need for more detailed evidence to support predator control measures, including mink management.

4.2.7. The concerns raised during consultation, particularly those relating to the body of evidence required to inform the measures and provide certainty in their delivery, have been carefully considered. Where appropriate, these concerns have led to refinements in the assessment methodology and updates to the targeted compensation measures, ensuring alignment with regulatory expectations and best practice.

4.2.8. Compensation checklists supplied by NatureScot for both the disturbance reduction (Table 4.12) and predator control (Table 4.14) measures can be found at the end of each respective measure's section.

MEASURES NOT CARRIED FORWARD

4.2.9. Following receipt of the consultee responses to the Muir Mhòr application, the Applicant has decided not to carry certain measures forward. Both NatureScot and RSPB Scotland have opposed the Artificial Nesting Structure (ANS) compensation measure proposed by the Applicant. The reason provided for this opposition is that nesting habitat is not generally considered a limiting factor for kittiwake in Scotland and as such, it was felt that the Applicant should focus on other factors that may be contributing to kittiwake decline. In response, the Applicant has decided not to carry the ANS measure forward and has notified NatureScot and RSPB Scotland of this decision.

4.2.10. RSPB Scotland emphasised the importance of demonstrating that mink predation is occurring at colonies of interest, that it is having a measurable impact on breeding productivity, and that any proposed intervention is both feasible and likely to result in a positive response from target species. Mink management was put forward in the Application as a potential predator control measure. However, mink management was only proposed as a measure should a partnership be secured with the Scottish Invasive Species Initiative (SISI) for their Mink Control Programme. The Applicant is instead pursuing a potential predator control programme with NTS at their seabird islands and expansion of the coverage of biosecurity measures. Mink are no longer the sole focus of this measure, as several types of predators will be addressed through the NTS partnership. However, the Applicant will consider RSPB Scotland's guidance when developing the NTS predator control programme.

4.2.11. Furthermore, in light of the partnership with NTS, the original proposed locations for predator control in the Firth of Forth (Inchcolm and Inchkeith) are no longer being considered. These islands are not under the management of NTS nor SSC and the need for predator control on

these islands has not been fully established. In contrast, NTS require predator control to continue to support the biosecurity programme established on its islands by Biosecurity For LIFE, the funding for which ran out in 2023.

STAKEHOLDER MEETINGS

4.2.12. Several meetings have taken place between Muir Mhòr (GoBe Consultants and the Applicant) and the potential partners, as well as a meeting with NatureScot. A list of these meetings is found in Table 4.2. It should be noted here that RSPB Scotland have requested not to be consulted until the measures are finalised and as such no meetings with RSPB Scotland have taken place since the application was submitted. The Applicant will consult with RSPB Scotland once the measures are suitably developed, as requested.

Table 4.2 Stakeholder Meetings

Date	Participants
29 May 2025	Scottish Seabird Centre, GoBe Consultants
29 May 2025	National Trust for Scotland, GoBe Consultants, Applicant
9 July 2025	Scottish Seabird Centre, GoBe Consultants, Applicant
10 July 2025	National Trust for Scotland, Caledonia, Applicant
23 July 2025	NatureScot, GoBe Consultants, Applicant
4 August 2025	Scottish Seabird Centre, GoBe Consultants
4 September 2025	NatureScot, GoBe Consultants, Applicant

4.3. REVISED COMPENSATION REQUIREMENT

4.3.1. Following the consultee responses to the Environmental Impact Assessment Report submitted to MD-LOT In November 2024, and the associated updates to the ecological assessments, several of the identified impacts on species at designated sites have been revised. As a result, this section presents the updated compensation quantum calculated for five species that may require compensatory measures.

4.3.2. These impact assessments have been revised in response to MD-LOT's requests following consultation with NatureScot. However, the Applicant maintains confidence in the original application's findings, which were based on SeabORD rather than the matrix approach for assessing impacts on Special Protection Areas (SPAs), particularly for guillemot. For further information see AIR Appendix 2 (Additional Information on SeabORD).

PREDICTED IMPACTS TO DESIGNATED SITES

Table 4.3 summarises the predicted impacts to SPAs for which an Adverse Effect on Integrity (AEoI) could not be ruled out for in-combination effects. It should be noted that the Applicant's conclusions may differ from the conclusions drawn in the appropriate assessment by the competent authority. Therefore, the SPAs and mortalities presented below are subject to change.

Table 4.3. Summary of the Predicted Impacts to SPAs for which an AEoI Could not be Ruled out

Species	Population	Project-only predicted annual mortality of breeding adults (NatureScot range)
Kittiwake	Buchan Ness to Collieston Coast SPA	9.36 – 11.95
	East Caithness Cliffs SPA	3.30 – 4.31
	Farne Islands SPA	0.44 – 0.58
	Forth Islands SPA	0.87 – 1.12
	Fowlsheugh SPA	6.81 – 8.70
	North Caithness Cliffs SPA	0.79 – 1.04
	St Abbs Head to Fast Castle SPA	0.64 – 0.82
	Troup, Pennan and Lion's Heads SPA	4.81 – 6.16
	West Westray SPA	0.36 – 0.49
	Total	**27.39 – 35.18**
Guillemot	Buchan Ness to Collieston Coast	**89.59 – 176.98**
Razorbill	Fowlsheugh SPA	6.21 – 10.49
	Troup, Pennan and Lion's Heads SPA	2.57 – 4.35
	Total	**8.79 – 14.84**
Puffin	Forth Islands SPA	6.58 – 10.97
	North Caithness Cliffs SPA	0.26 – 0.43
	Total	**6.84 – 11.4**
Gannet	Flamborough Head and Filey Coast SPA	0.61 – 1.19
	Forth Islands SPA	5.92 – 10.6
	Total	**6.53 – 11.79**

CALCULATION OF COMPENSATION REQUIREMENT

4.3.3. The requirement for delivering compensation depends on the risk of AEoI at SPAs, wherein the aim is to deliver adults back into the breeding population. The approach used to determine the appropriate compensation requirement depends on the intended outcome of the measure, whether it seeks to boost the population by increasing fledgling numbers (which eventually contribute to the adult breeding population) or aims to reduce mortality rates directly. Increasing the number of fledgelings can be achieved by increasing nesting space and increasing productivity. Compensation through disturbance reduction and predator control aims to increase fledgling numbers (juvenile birds capable of leaving the nest and potentially joining the adult breeding population). Each species will therefore have a specific number of fledglings that must survive to adulthood to deliver the required level of compensation.

4.3.4. This is made up of two factors: the number of adult birds to be compensated for and the number of chicks that need to fledge to ensure that enough birds survive to adulthood (based on age specific rates of survival). The compensation calculation developed by Hornsea Four is considered the most appropriate and is used here to determine the number of breeding pairs required to compensate for the Proposed Development's impact on the species of interest: black-legged kittiwake (*Rissa tridactyla,* Table 4.5*,* common guillemot (*Uria aalge*, Table 4.6), razorbill (*Alca torda*,

4.3.5.

4.3.6. Table 4.7), Atlantic puffin (*Fratercula arctica*, Table 4.8), and northern gannet (*Morus bassanus;* Table 4.9). The calculation uses published demographic rates to determine the

number of breeding pairs that would be required to deliver a number of adult birds equivalent to the project's impacts. The first stage determines the number of fledgelings that would be required to deliver the required number of adults. This is calculated using published age-specific survival rates (for example from Horswill and Robinson 2015) to determine the proportion of young that survive to adulthood. This number of young is then multiplied by the productivity rate (also taken from Horswill and Robinson 2015). This determines the number of breeding pairs required to generate the required number of young birds. These tables provide an idea of the compensation requirement required should the impacts presented in the Report to Inform Appropriate Assessment (RIAA) remain unchanged. Full calculation methodologies will be provided in the compensation package. The demographic rates used in calculating the compensation requirements are presented in Table 4.4.

Table 4.4 Demographic Rates Used in Calculating the Compensation

Demographic rate	Kittiwake	Guillemot	Razorbill	Puffin	Gannet
Juv survival	0.790	0.560	0.794	0.892	0.424
Imm (yr 2) survival	0.854	0.792	0.794	0.892	0.829
Imm (yr 3) survival	0.854	0.917	0.895	0.892	0.891
Imm (yr 4) survival	NA	0.917	0.895	0.760	0.895
Imm (yr 5) survival	NA	0.917	NA	0.805	NA
Survival until adulthood	0.492	0.337	0.452	0.434	0.280
Ad survival	0.854	0.939	0.895	0.906	0.919
Productivity	0.819	0.672	0.570	0.617	0.700

Table 4.5 Kittiwake Compensation Calculation Results

Kittiwake Population	New Recruits Required	Fledglings Required	Breeding Pairs Required
Buchan Ness to Collieston Coast SPA	9.36 – 11.95	19.02 – 24.29	22.23 – 29.65
East Caithness Cliffs SPA	3.30 – 4.31	6.91 – 8.76	8.44 – 10.70
Farne Islands SPA	0.44 – 0.58	0.89 – 1.18	1.09 – 1.44
Forth Islands SPA	0.87 – 1.12	1.77 – 2.28	2.16 – 2.78
Fowlsheugh SPA	6.81 – 8.70	13.84 – 17.68	16.90 – 21.59
North Caithness Cliffs SPA	0.79 – 1.04	1.61 – 2.11	1.96 – 2.58
St Abbs Head to Fast Castle SPA	0.64 – 0.82	1.30 – 1.67	1.59 – 2.03
Troup, Pennan and Lion's Heads SPA	4.81 – 6.16	9.78 – 12.52	11.94 – 15.29
West Westray SPA	0.36 – 0.49	0.73 – 1.00	0.89 – 1.22
Total	27.39 – 35.18	55.67 – 71.50	67.97 – 87.30

Table 4.6 Guillemot Compensation Calculation Results

Guillemot Population	New Recruits Required	Fledglings Required	Breeding Pairs Required
Buchan Ness to Collieston Coast SPA	89.59 – 176.98	266.06 – 525.59	395.92 – 782.12

Table 4.7 Razorbill Compensation Calculation Results

Razorbill Population	New Recruits Required	Fledglings Required	Breeding Pairs Required
Fowlsheugh SPA	6.22 – 10.51	13.76 – 23.25	24.12 – 40.80
Troup, Pennan and Lion's Heads SPA	2.58 – 4.37	5.71 – 9.67	10.01 – 16.96
Total	8.8 – 14.88	19.47 – 32.92	28.27 – 57.76

Table 4.8 Puffin Compensation Calculation Results

Puffin Population	New Recruits Required	Fledglings Required	Breeding Pairs Required
Forth Islands SPA	6.58 - 10.97	15.15 - 25.26	24.56 - 40.95
North Caithness Cliffs SPA	0.26 - 0.43	0.60 - 0.99	0.97 - 1.61
Total	6.84 - 11.4	15.75 - 26.25	25.53 - 42.55

Table 4.9 Gannet Compensation Calculation Results

Gannet Population	New Recruits Required	Fledglings Required	Breeding Pairs Required
Flamborough Head and Filey Coast SPA	0.61 – 1.19	2.18 – 4.25	3.11 – 6.06
Forth Islands SPA	5.92 – 10.60	21.12 – 37.82	30.17 – 54.04
Total	6.53 – 11.79	23.30 – 42.07	33.28 – 60.10

4.4. FURTHER EVIDENCE – REDUCTION OF DISTURBANCE

4.4.1. The Applicant understands that NatureScot and the RSPB agree that disturbance reduction measures have the potential to compensate for offshore wind impacts. Both organisations, however, state that more detail on proposed schemes are required, including:

- Further quantification of any existing pressures and the scale of disturbance (i.e., evidencing the need for disturbance reduction);
- Which colonies and species would benefit (i.e., site selection);
- Frequency and duration of the measure and predicted effectiveness;
- How success will be demonstrated through monitoring of resulting productivity increases; and
- Any landowner agreements (including Sites of Special Scientific Interest, SSSIs).

ENGAGEMENT WITH THE SCOTTISH SEABIRD CENTRE

4.4.2. In November 2024, SSC signed a Memorandum of Understanding (MoU) with the Applicant to create a campaign to raise awareness of seabird conservation (including threats and helpful actions) amongst visitors to the Firth of Forth (e.g., SSC headquarters and Bass Rock), fishers, and young people (including school children). In addition, the campaign would include

outreach activities with relevant groups and organisations, as well as the installation of signage, such as at slipways, to remind independent recreational users of the appropriate protocols to follow when operating near seabirds. There is also potential for the proposed educational campaign to be scaled up to reach more areas of Scotland, thus making the measure adaptable and scalable.

4.4.3. Activities proposed by SSC include developing a suite of classroom resources (slides, interactive games, and citizen science activities) focussed on seabird disturbance and how to avoid it. These resources would be used to deliver workshops around the Firth of Forth. SSC will produce leaflets, infographics, web and social media resources, and signage to highlight responsible behaviours to adopt around seabirds and their colonies. Furthermore, SSC will work with local countryside rangers to ensure that key areas and audiences have access to the resources needed to tackle disturbance.

4.4.4. In addition, working with SSC could provide the opportunity to partner with the WiSe (Wildlife Safe) Scheme and increase the number of WiSe-accredited organisations. WiSe is an expert-led certified course aimed at individuals, businesses, and organisations to help them gain the knowledge and skills they need to act responsibly around marine and coastal wildlife. There are several recreational organisations on the eastern coast of Scotland which could benefit from WiSe accreditation. The Applicant will support SSC in their campaign by identifying potential recreational organisations that could benefit from awareness-raising sessions and WiSe accreditation. Furthermore, SSC aims to develop a study as part of this campaign to investigate the effects of human disturbance on breeding seabirds in the Firth of Forth by comparing seabird behaviour areas where visitors are and are not present.

RESPONSES TO CALLS FOR EVIDENCE

EVIDENCING THE BENEFITS OF EDUCATION IN CONSERVATION PROJECTS

4.4.5. There is a significant amount of evidence to support the use of Environmental Education (EE) or Conservation Education (CE) as a biological conservation tool (Kühn et al., 2008; Curti and Valdez, 2009; Howe et al., 2012; Ardoin et al., 2020; Bergamo et al., 2023). Some studies have been able to provide quantitative results through questionnaires and interviews. For example, following a public awareness campaign to protect the critically endangered saiga antelope (Saiga tatarica), Howe et al. (2012) found that participant attitudes and behavioural intention toward the saiga had positively changed. Indeed, out of 250 people interviewed across eight villages, the opinion of 47% of participants changed from being negative or indifferent to the saiga to positive, while 82% of respondents made a monetary donation to saiga conservation at the close of the campaign (Howe et al., 2012).

4.4.6. Practical, hands-on, community-based learning is a crucial part of CE practices. To involve and educate members of the farming community in Japan, a campaign was first undertaken to raise awareness about the important role of rice paddy fields in maintaining biodiversity and promoting waterfowl habitat (Kobori, 2009). Geese are a particular concern for rice farmers, as they consume large amounts of rice during their migratory stopover at Kabukuri-numa, and as such farmer perceptions had to change to support the campaign's objectives (Kobori, 2009). Within a few years of the project's start, wildfowl numbers increased, with 3000 individual white-fronted geese (Anser albifrons) recorded in the first year of the project (Kobori, 2009).

4.4.7. Evidence suggests that further environmental education is needed in Scotland, with studies showing gaps in EE due to prioritisation and disconnects between environmental policy and what is taught in schools, despite an interest in the natural environment and sustainability by young people (Stockwell, 2025; Ward et al., 2025). Indeed, young people in Fife were found

to be considerably more interested in learning about the marine and coast environment than those aged over 65 (Spoors et al., 2021). However, there is often a disconnect in EE between studying the mechanisms of the natural world and the real-world impacts of human activities (Wynes and Nicholas, 2019). A lost opportunity has been highlighted at instilling environmental practices from a young age in Scotland, as having an environmentally conscious population in Scotland could help support much needed strengthening of environmental policies, particularly where conservation is concerned (Spoors et al., 2021).

4.4.8. However, research on secondary education in Scotland also highlights the socioeconomic barriers faced by students in their choice of subjects to study (Black, 2025), and as such promoting environmental awareness via an educational campaign that is available to young people from all socioeconomic backgrounds may spark interest in conservation or inspire confidence in students struggling with their study subject choices at GCSE and A-Level. Nature-based EE has been shown to promote children's connection to nature, but in New Zealand for example, this effect was largely seen in children who had previously connected to nature (Whitburn et al., 2023), thus supporting the need for accessible EE campaigns from an early age. Indeed, EE programmes such as the proposed campaign can be an important tool in conservation biology, by helping young people understand the negative impacts of climate change, land use change, and human population growth on biodiversity (Børresen et al., 2022).

4.4.9. Furthermore, it has been demonstrated that educating young people about nature and the environment will influence their wider communities as students become stewards of nature (Dominguez Contreras and Krasny, 2022). For example, in Quebec, a CE campaign that included educating young people in schools and organising youth summer conservation programmes on the illegal harvest of nesting seabirds and their eggs resulted in a decrease from 95% of families believing the practice to be an acceptable food-harvesting method in 1981 to 29% in 1988 (Blanchard and Monroe, 1990; Byers, 2003). Populations of the most threatened species roughly doubled in the ten years of the programme (Blanchard and Monroe, 1990).

4.4.10. The proposed campaign goes beyond school-age education and would also target local communities and stakeholders. Working with local communities has been shown to reduce perceived threats from wildlife and help promote their survival, such as in the case of the harpy eagle (*Harpia harpyja*), which is considered by Panamanians to be a threat to livestock and livelihood and as such has been hunted despite being a threatened species (Curti and Valez, 2009). The campaign decreased participants' fear of the harpy eagle and a decrease in human-caused mortalities has been reported (Curti and Valez, 2009). While there may not be an equivalent to the harpy eagle threat in Scotland, human-wildlife conflicts are a global issue and are indeed present in Scotland. For example, seabirds are at risk due to competition for prey species with the fishing industry (Grémillet et al., 2018).

SSC is a marine conservation and education charity with an award-winning visitor centre located in North Berwick. SSC run several conservation and research projects, including the SOS Puffin Project to save puffin burrows from tree mallow growth, a heat-stress research project, avian influenza checks, and seabird monitoring programmes on the islands they manage. In addition, SSC offer a core programme of indoor and outdoor workshops for primary and secondary school pupils. SSC also deliver several education and outreach programmes, including through workshops with primary schools, engagement at wildlife clubs and presence at festivals.

EVIDENCING THE USE OF DISTURBANCE REDUCTION

4.4.11. SSC oversee several islands in the Firth of Forth where seabirds breed. There has been a decline in several species in the Firth of Forth and these species may benefit from disturbance reduction measures. Table 4.10 provides an overview of species and colonies within the Firth

of Forth SPA which are currently under the remit of SSC and the RSPB, as well as population trends (up to 2024 in most cases), before and after the 2022 highly pathogenic avian influenza (HPAI) outbreak. The species listed are those identified as requiring compensation by the Applicant.

Table 4.10 Seabird Colonies and Species Population Trends at the Firth of Forth SPA

Site	Species	Dates	% Change
Bass Rock	Kittiwake	2021-2024	-25%
	Gannet	2004-2014	57%
	Guillemot	2021-2024	-13%
	Razorbill	2021-2024	22%
	Puffin	2018-2024	100%
Craigleith	Kittiwake	2021-2024	-16%
	Guillemot	2021-2024	-71%
	Razorbill	2021-2024	66%
	Puffin	2021-2024	23%
Fidra	Kittiwake	2021-2024	3%
	Guillemot	2021-2024	-79%
	Razorbill	2021-2024	-11%
	Puffin	2021-2024	-8%
Isle of May	Kittiwake	2021-2024	5%
	Razorbill	2021-2024	-11%
	Puffin	2017-2024	33%
The Lamb	Kittiwake	2021-2024	-100%
	Guillemot	2021-2024	-86%
	Puffin	2021-2024	2%
Inchmickery	Puffin	2021-2024	-3%

4.4.12. Water sports companies around North Berwick and Aberdour practise activities such as stand-up paddleboarding (SUP) and sea kayaking that may disturb breeding seabirds at the Firth of Forth islands listed above, as well as those seabirds out foraging. Many water sports companies are not listed as being under the WiSe Scheme, nor is it clear whether they have been trained in wildlife safety. The Applicant will support SSC in their campaign by identifying potential recreational organisations that could benefit from awareness-raising session and WiSe accreditation. Additional measures will be taken by the Applicant, such as putting up signage at slipways to remind independent recreational users which protocol(s) to follow when carrying out their activity in proximity to seabirds. This will require approval from the council and/or landowners but will not restrict access to the waters surrounding the islands nor prevent any person from enjoying their water sports activities.

4.4.13. In addition to the campaign, the Applicant proposes to identify areas where signage may be useful at raising awareness of seabird conservation among water sports enthusiasts and the general public. Simple education measures such as signposting have proven effective at reducing human disturbance. Ease of reading, imagery, and graphics are important components of effective conservation signage (Scane, 2020). On the Vatnsnes peninsula in northwest Iceland, a popular seal-watching site, signage was shown to prevent visitor behaviour that could disturb seals, with signs that explain the purpose of the instructions having a greater effect than signs without (Marschall *et al.*, 2017). Signage was also found to

have a significant effect on the nesting success of little tern (*Sterna albifrons*) in Portugal (Medeiros *et al.*, 2007).

4.4.14. For gannet, educational signage about potential disturbance effects of visitors reduced the distance visitors approached nests by 74% (Allbrook and Quinn, 2021). A study by Rice *et al.* (2023) found that signage instructing visitors to clean their shoes to reduce the spread of invasive plant species proved effective in getting the attention of visitors, and that visitors responded positively to a mixture of both authoritative and attractive messaging. Level of knowledge regarding target species varies, and visitors may not know how to (or not to) interact with wildlife (Donnelly *et al.*, 2021). Signage can therefore reduce disturbance through educating visitors, such as in the case of Spinner dolphins (*Stenella longirostris longirostris*) on Hawai'i Island's west coast, wherein visitors were more likely to change their behaviour where signage was present (Donnelly *et al.*, 2021). The Applicant will partner with local water sports clubs or organisations (e.g., sea-kayaking or the Royal Yachting Association) and bespoke sports and recreation apps (e.g., Strava) to help notify users entering an area of potential disturbance and provide guidance on how to behave around wildlife to reduce disturbance. These organisations can then provide wildlife safety briefings to their members or clients before any activity or outing. Research shows that awareness raising amongst water sports groups or organisations to sensitive recreational activity participants to nature conservation issues can help prevent seabird disturbances (Bull and Rödl, 2018; Kleiner and Hunziker, 2023). In addition to installing physical signage at high-traffic areas, working to include virtual signage via alerts when approaching an area where seabirds are known to breed can also increase level of engagement and awareness-raising with the public.

4.4.15. EE or CE programmes and other preventative measures have tangible benefits, some which may be felt immediately, such as changes in perception and increased participation in conservation efforts. However, long-term conservation impacts, such as those related to habitat loss or species recovery, are slow to materialise (Trewhella *et al.*, 2005). This delayed return is nevertheless not a reason to forego such efforts. Conservation efforts often lack funding and resources (Arkema *et al.*, 2006; Koontz and Bodine, 2008; Schéré, 2024) and as such the Applicant is well-placed to help support the SSC in the development and implementation of the proposed campaign by providing the funding and resources needed.

SPECIES AND SITE SELECTION

4.4.16. The species of focus are common guillemot, razorbill, Atlantic puffin, black-legged kittiwake, and northern gannet. The awareness-raising campaign will cover all of these species, with gannet being the species of focus at Bass Rock as it is the largest northern gannet colony in the world.

4.4.17. SSC proposes to carry out baseline monitoring and study the effects of disturbance on seabirds (see Table 4.10 for species list) at Bass Rock, Craigleith, and the Lamb, islands in the Firth of Forth managed by SSC. These islands are exposed to frequent visitation and traffic from sea users, particularly sea-kayakers and stand up paddleboarders and indeed the waters off North Berwick see the highest water sports activity in the entire Firth of Forth (Strava, 2025). There is scope to expand the monitoring activities to other Firth of Forth islands, but this will require landowner agreements. The Applicant will secure any landowner agreements required to carry out measures on non-SSC islands. SSC are currently exploring the possibility of including islands not under their management in their disturbance reduction study, and agreement from landowners will be sought in this case

4.4.18. While the WiSe scheme can educate tour operators and sports organisations, many visitors around the coast and to the seabird islands in the Firth of Forth operate independently and as such are difficult to target through such as scheme as WiSe. Awareness-raising will be carried out through the SSC by engaging with various stakeholder groups, including local fishers and schools. To further the awareness campaign, signage will be installed in locations such as

beaches and harbours where sea users (i.e., water sports enthusiasts and personal boat owners) are likely to launch or depart from.

4.4.19. The following sites have been identified as potential locations for signage and other awareness interventions (Table 4.11). SSC are currently developing this list and as such it is subject to change, with more sites to be added.

Table 4.11 Potential Sites for Signage

Site	City or Town
Seacliff Beach	North Berwick
Seacliff Harbour	North Berwick
Canty Bay	North Berwick
Haugh Road Beach	North Berwick
Milsey Bay Beach	North Berwick
West Bay Beach	North Berwick
Yellowcraig Beach	North Berwick
Gullane Beach	Gullane
Aberlady Bay Beach	Gullane
Longniddry Beach	Longniddry
Portobello Beach	Edinburgh
South Queensferry Harbour	Queensferry
Black Sands	Aberdour
Silver Sands Beach	Aberdour
Elie Beach	Elie and Earlsferry
Ruby Bay	Elie and Earlsferry

FREQUENCY AND DURATION OF THE MEASURE

4.4.20. The educational campaign will be designed to last throughout the operational life of Muir Mhòr Offshore Wind Farm (approximately 35 years). Campaign materials will be updated and awareness-raising activities will be carried out periodically over the next three decades to reach future generations and provide a reminder to current generations of the impacts of disturbance on seabirds and how to mitigate them.

4.4.21. The long-term educational campaign for the Muir Mhòr Offshore Wind Farm offers a unique opportunity to build lasting awareness around seabird disturbance and conservation. Over the next 35 years, outreach will evolve to remain relevant to changing audiences, technologies, and environmental challenges.

4.4.22. The integration of Artificial Intelligence (AI) and digital platforms will be explored. AI may enhance data gathering and analysis from seabird monitoring, allowing for real-time insights into disturbance patterns and productivity trends. These insights can directly inform the design of targeted educational materials and adaptive messaging.

4.4.23. App-based learning has begun to play a key role in engaging young people. Interactive tools could offer location-aware guidance to coastal users, immersive educational experiences for schools, and citizen science platforms for community involvement. These technologies will make conservation education more accessible, personalised, and impactful.

4.4.24. As public behaviours and recreational activities shift, outreach will also become more behaviourally informed and audience specific. Messaging tailored to drone users, dog walkers, and sea users will help reduce disturbance through proactive engagement.

Partnerships with local authorities, schools, and tourism operators will ensure consistent messaging and long-term community buy-in.

4.4.25. Ultimately, the campaign will grow into a dynamic, data-driven programme that adapts over time, delivering not just environmental protection, but also social value and educational legacy.

4.4.26. In addition to the awareness-raising campaign, regular monitoring of productivity and disturbance will be carried out during the breeding season to continuously inform the progress of the campaign and provide data on which to develop new campaign items as appropriate.

DEMONSTRATION OF SUCCESS

4.4.27. To understand and mitigate the impact of visitor disturbance target species colonies within the Firth of Forth, a monitoring and management programme will be implemented. It is no longer possible to carry out this programme at Bass Rock and Craigleith for at least the next two years due to unforeseen circumstances, which SSC informed the Applicant in August 2025. SSC were not at liberty to disclose the reason behind this decision. As such, the Applicant is consulting with SSC to identify other sites where disturbance monitoring can be carried out to act as proxies for Bass Rock and Craigleith. Success will be demonstrated using multiple lines of evidence at varying levels of certainty. This includes:

- Survey data to understand changes in visitor mindset and awareness after education;
- Direct behavioural monitoring to assess how visitors respond to interventions;
- Measurements of disturbance events compared between treatment (managed) and control (unmanaged) sites; and
- Ecological metrics, such as breeding success and productivity, again compared between treatment and control sites.

4.4.28. The ultimate aim of this approach is to demonstrate the success of the measure, including ecological benefits of disturbance reduction on populations, as definitively as possible. Collecting data across multiple levels will help quantify the effect of human presence on nesting success and inform future conservation actions.

4.4.29. Through systematic monitoring during the breeding season, disturbance hotspots will be identified (i.e., areas where visitor activity is most likely to disrupt breeding behaviour). These insights will guide the development of site-specific mitigation measures aimed at reducing disturbance levels. Potential interventions may include:

- Restricting visitor numbers during sensitive periods;
- Managing visitor distribution to avoid high-risk nesting zones;
- Reducing visibility of humans to breeding birds through screening or redirecting trails; and
- Enforcing activity restrictions, such as bans on drone use near colonies.

4.4.30. To assess the effectiveness of awareness-raising efforts, a before-after survey approach will be used. Visitors will be surveyed before and after educational interventions to measure changes in their understanding of seabird ecology and responsible behaviour. This will be complemented by broader questionnaires and behavioural observations to evaluate shifts in attitudes and actions.

4.4.31. Looking ahead, AI-powered tools may enhance both data collection and public engagement. For example, mobile apps could use AI to interpret visitor behaviour, deliver tailored educational content, and even guide users away from sensitive areas in real time. These

technologies offer scalable, adaptive solutions that can evolve alongside the campaign and help ensure long-term conservation success.

LANDOWNER AGREEMENTS

4.4.32. Partnering with SSC provides direct access to three islands with breeding seabird populations that are in a region of high water activity (note these are now not available until at least 2027). The Applicant is continuing to identify alternative sites that are prone to disturbance and lend themselves to disturbance monitoring and will provide further detail in the compensation package. SSC already have agreements in place and working trusted relationships with key stakeholders in this region. In order to further expand on the disturbance reduction study into the Firth of Forth, landowner agreements will need to be secured with the owners of non-SSC islands, such as Isle of May or Inchcolm. Furthermore, the installation of signage at the sites listed in Table 4.11 will require authorisation from the appropriate local council. The Applicant is committed to building relationships with landowners in the hopes of expanding the reach of the disturbance reduction study and increase coverage in the Firth of Forth.

POSSIBLE EFFECTS OF DISTURBANCE REDUCTION ON WIDER ECOSYSTEMS

4.4.33. Baseline and subsequent monitoring have the potential to disturb birds due to human presence. In particular, Craigleith and the Lamb are generally left unvisited by SSC during the breeding season. However, there is evidence of visitor presence both at sea and from disembarkations onto the islands, despite there being no formal paths or slipways to dock. As such, the utmost care should be taken when surveying these islands for human disturbance and productivity.

4.4.34. The use of remote monitoring via drones and fixed cameras is being explored to avoid disturbance to seabirds while collecting high quality data on disturbance pressures and breeding success. Installation of signage and fencing may also have a negative effect on surrounding seabirds and other wildlife. However, carrying out these installations during the non-breeding season or during times of low animal activity could reduce the risk of negative impact.

4.4.35. Disturbance reduction measures designed to protect the species of interest have the potential to benefit other seabird species. It must be noted, however, that an increase in the populations of certain seabird species, such as large gulls, can have a negative effect on the species of interest, because gulls (such as greater black-backed gulls (*Larus marinus*)) are known to predate kittiwake and auks, and in particular their chicks and eggs (Lopez *et al.*, 2023).

Table 4.12 NatureScot Compensation Checklist – Disturbance Reduction

Checklist Question	NatureScot advice	Applicant Response
Is this measure technically feasible?	In principle, we agree that an education and outreach programme to reduce human disturbance is technically feasible. Further detail is required, including appropriate stakeholder engagement, to satisfy that measures at the specific sites proposed would be feasible.	The proposed disturbance reduction measures are technically feasible. The Applicant has reached a MOU with SSC to partner in delivering these measures. SSC is supportive of undertaking this work with the Applicant but must obtain final board approval before it issues a formal acceptance of partnership. SSC is currently developing a methodology statement in partnership with the Applicant and GoBe Consultants to detail the technical feasibility of these measures. Alongside SSC the Applicant is looking to expand the scope to the wider region. Further monitoring will take place from 2026 to better understand the proposed sites and potential benefits form these measures. SSC will utilize its existing networks and educational programming to help provide education and outreach. It is feasible that the educational campaign will take place over the lifetime of the project.
Is this measure financially viable?	The Applicant is willing to finance this work and an appropriate mechanism will need to be agreed.	The Applicant has committed to providing the necessary finance to carry out the disturbance reduction measures. The frequency and mechanism of payments will be discussed further with SSC. The Applicant will provide any required resources to SSC leading up to and following consent. The Applicant will provide funding towards a full-time position from 2026 that will focus on the development of these measures.
Is the measure legally securable?	Please note our advice above with respect to landowner agreement and consents required and any requirements to comply with the SOAC.	The principal delivery of the measure does not necessarily require landowner agreements, as it is an educational campaign. However, the Applicant acknowledges the importance of obtaining landowner permission in monitoring and implementing these measures. Several potential implementation sites (Bass Rock, Craigleith, Fidra, The Lamb, and Inchmickery) already fall under the remit of potential delivery partners (SSC). While these partners have already stated their support for these measures, the Project and SSC will help obtain landowner agreements for additional sites that do not fall under their purview.
Is this measure deliverable?	In principle, we agree that an education and outreach programme to reduce human disturbance is deliverable. Further detail is required, including appropriate stakeholder engagement, to satisfy that measures at the specific sites proposed would be deliverable.	The Applicant has reached a MoU with SSC to undertake a partnership to implement these measures. SSC is supportive of undertaking this work with the Applicant but must obtain final board approval before it issues a formal acceptance of partnership. SSC will utilize its existing networks and educational programming to help provide education and outreach. SSC and GoBe Consultants have current ties to the WiSE scheme and can help arrange the implementation of these measures at the proposed sites. The Applicant will scout and engage with local organisations to get buy-in and determine the best way to engage with them to achieve maximum benefit to seabirds.

Checklist Question	NatureScot advice	Applicant Response
Is this measure ecologically effective (i.e., sufficient)?	We agree there is ecological merit in reducing human disturbance at seabird colonies. Further site-specific evidence is required, however, to establish the extent of disturbance, as well as which colonies and species would benefit and the predicted effectiveness of the proposed measure.	The Applicant will undertake baseline monitoring to understand the extent of disturbance from the 2026 breeding season. The Applicant will also contribute towards a full-time position to help plan for and implement this measure from 2026. The Applicant has provided evidence for the existence of recreational disturbance and seabird decline for kittiwake, gannet, guillemot, razorbill, and puffin at potential sites in the Firth of Forth (Bass Rock, Craigleith, Fidra, Isle of May, The Lamb, and Inchmickery). Potential implementation sites for signage have been identified by the Applicant. Success will be demonstrated using a mixed methodology including visitor surveys, direct behavioural monitoring, using control sites to quantify disturbance events, and ecological metrics such as breeding success and productivity.
Will this measure be effective before adverse effects arise?	The Applicant intends to implement the measure before the proposed development becomes operational. A detailed breakdown of the timescales for each stage of the proposed compensation measure would have been useful to support this.	The Applicant has committed to funding these measures from 2026. This includes creating a full-time position dedicated to implementing the measures and carrying out baseline monitoring, well before the Project becomes operational. Baseline monitoring is essential to establish conditions prior to implementing the measures. Nevertheless, the Applicant is confident that disturbance reduction measures can be in place before construction begins.

NEXT STEPS

4.4.36. To ensure the measure is developed and ready for implementation following consent, a clear way forward for this partnership to develop must be established. The Applicant commits to supporting SSC in the development of their programme by offering to provide the required resources leading up to and following consent. SSC are supportive of collaboration with the Applicant and await board approval to formally accept the partnership.

4.4.37. A methodology statement detailing the implementation of the disturbance reduction campaign is being developed by the Applicant, with support from SSC and GoBe Consultants. In addition, the Applicant is continuing to identify alternative sites that are prone to disturbance and lend themselves to disturbance monitoring and will provide further detail in the compensation package. At this point a full assessment and a quantification of potential benefits will be provided in the compensation package.

4.4.38. The Applicant will scout and engage with local organisations to get buy-in and determine the best way to engage with them to achieve maximum benefit to seabirds. Finally, the Applicant will provide funding for a full-time position from 2026 to fully develop and progress this measure.

4.5. FURTHER EVIDENCE – PREDATOR CONTROL

4.5.1. The Applicant understands that NatureScot and the RSPB agree that predator control measures have the potential to compensate for offshore wind impacts. Both organisations, however, state that more detail on proposed schemes are required, including:

- Further quantification of any existing pressures and the scale of predation (i.e., evidencing the need for predator control);
- Which colonies and species would benefit (i.e., site selection);
- Frequency and duration of the measure and predicted effectiveness;
- How success will be demonstrated through monitoring of resulting productivity increases; and
- Any landowner agreements (including Sites of Special Scientific Interest, SSSIs).

ENGAGEMENT WITH THE NATIONAL TRUST FOR SCOTLAND

4.5.2. NTS have expressed the desire to expand predator control on its seabird-nesting islands via the development of a new programme. However, due to the scale of the area requiring coverage, such a programme requires full-time coordination, particularly during its development and set up. A full-time position dedicated to this predator control programme is therefore necessary. The Applicant will provide NTS with funding to support this programme to signify the Applicant's commitment to predator control on NTS islands. As conversations around strategic compensation and what this process will look like are progressed, the Applicant believes that pioneering a predator control programme that could be scaled up for other Applicants to buy into down the line would in essence see the development of a pilot project for strategic compensation. This would allow for issues in terms of funding, organisation, implementation, and adaptive management to be ironed out on a smaller, more manageable, scale at first. In addition, the feasibility of the programme as a strategic compensation measure would be determined through this piloting phase. The Applicant has thus decided to collaborate with Caledonia (located approximately 145 km west of Muir Mhòr in the Moray Firth) to deliver a predator control compensation measure with NTS.

4.5.3. The evolution of the programme as a strategic compensation measure would be determined through this piloting phase. The scalability of this programme and the constant threat of invasive mammalian predators reaching these islands shows this measure can feasibly remain in place, delivering benefits for the duration of the Muir Mhòr Offshore Wind Farm's lifetime (approximately 35 years).

4.5.4. The Applicant and Caledonia have signed a Non-Disclosure Agreement (NDA) and an MoU to work together with NTS and GoBe Consultants on the development of the NTS predator control programme. This relationship will serve as a pilot programme for strategic compensation, with potential to scale-up the coverage of the predator control programme with the involvement of further Applicants in years to come. In addition, the Applicant is keen to engage in further strategic compensation measures with the Scottish Government through the Marine Recovery Fund (MRF). Should the MRF be operational in time for Applicant involvement (the MRF is currently aiming for a spring 2026 launch), this avenue will also be considered.

4.5.5. The concretisation of this partnership is dependent upon NTS board approval, which is anticipated by NTS staff. At present, a letter of commitment has been signed with NTS. The aim is to design and carry out an ambitious, evidence-based, and forward thinking programme of seabird recovery actions in Scotland. NTS has the expertise and manages key seabird sites for conservation and recovery but lacks the necessary funding. The Applicant and Caledonia share this vision and have access to funding but would require approval from NTS to deliver the measure.

RESPONSES TO CALLS FOR EVIDENCE

EVIDENCING THE NEED FOR PREDATOR CONTROL

4.5.6. Predation by Invasive Non-Native Species (INNS) poses a serious threat to seabird colonies, particularly those on islands (Ellis *et al.*, 2007; Brooke *et al.*, 2018). Species such as brown and black rats (*Rattus norvegicus*, *R. rattus*), feral cats (*Felis catus*), and mustelids such as American mink (*Neovison vison*), stoats (*Mustela erminea*), and otters (*Lutra lutra*) are known to predate seabird eggs, chicks, and adults (Latorre *et al.*, 2013; Craik, 1997; Ratcliffe *et al.*, 2010). Feral cats, which are capable of preying on larger birds, are particularly harmful to seabird populations and have contributed to the rapid decline of seabirds on Ascension Island (Ratcliffe *et al.*, 2010), for example. Rats, however, are considered the most significant threat, impacting 75 seabird species across 61 islands studied globally (Jones *et al.*, 2008). Rats and mustelids are excellent swimmers and can easily reach nearshore islands, while some mammalian predators are brought to vulnerable island habitats by humans, most often unintentionally via boats (Biosecurity for LIFE, 2024).

4.5.7. Whilst kittiwake nest sites are on steep cliffs and thus are less accessible to some mammalian predators compared to species nesting on cliff tops and in burrows (Cummins *et al.*, 2019), predators are still thought to impact their breeding success. For example, at St Abb's Head, half of the juvenile bird mortality in 1999 and 2001 was believed to have been due to American mink predation (Mavor *et al.*, 2002; Upton *et al.*, 2000).

4.5.8. Mammalian predation at auk colonies is less frequently reported than for other seabirds, likely because these colonies are in areas that are inaccessible to mammalian predators, such as cliffs, islands, or holes (Williams, 1974). Razorbill nest on cliff ledges or in crevices, often among boulders and frequently in mixed colonies with guillemot (Burnell *et al.*, 2023); guillemot similarly nest in dense colonies on cliff ledges, among boulder scree, and in various rocky island habitats (Tuck, 1960; Parslow, 1996). However, camera traps have captured otters preying on auk eggs (Johnston *et al.*, 2019), and razorbill nest failures have been documented in areas with brown rat activity (O'Hanlon and Lambert, 2017). As such, predator control at auk colonies has the potential to reduce mortalities and boost productivity.

4.5.9. Unlike razorbill and guillemot, puffin nest in burrows and crevices along the cliffs (Harris and Walness, 2011). Predation from mammals is considered to be a threat to puffin populations across the UK (Harris and Wanless, 2011). Burrow nesters are vulnerable to rat predation due to rats foraging and nesting in these areas (Jones *et al.*, 2008). Rat predation of puffin can cause serious declines, in some cases the complete absence of the species, or can limit their population growth on islands (Zonfrillo, 2001; Stoneman and Zonfrillo, 2005).

4.5.10. Anti-predator behaviour (i.e., birds flushing and leaving the nest unattended) can also have a detrimental effect on seabird productivity indirectly, as it forces birds to expend energy unnecessarily, regardless of whether predation occurs (Buckley, 2004; Frid and Dill, 2002; Hentati-Sundberg *et al.*, 2021). Leaving nests unattended in addition increases the risk of predation by non-mammalian predators, such as avian predators, which can access cliff-nesting colonies more easily (Chivers *et al.*, 2012).

PREDATION IN SCOTLAND

4.5.11. INNS have been identified on several Scottish islands. Multiple control programmes, such as the eradication of brown rats on Ailsa Craig in 1992 and on the Isles of Canna and Sanday in 2008, have been successful (Thomas *et al.*, 2017). Following the eradication of brown rats on Ailsa Craig in 1991, black guillemot and shelduck were able to colonise on the island along with puffin who re-colonised (Zonfrillo, 2001). Another example is The Hebridean Mink Project, set up in 2001 by NatureScot to prevent the spread of mink across the Outer Hebrides (NatureScot, 2023). Mink numbers are now very low in the Outer Hebrides, with only seven individuals caught in 2016, including one non-breeding female, and no juveniles have been caught since 2015 (NatureScot, 2023). Furthermore, Eradication on Handa led to an expansion of the puffin population across the island (Stoneman and Zonfrillo, 2005). However, recolonisation is always a risk; on Handa Island, brown rats were successfully eradicated in 1997, but have since recolonised the island (Thomas *et al.*, 2017).

4.5.12. Scotland currently has two active large-scale predator control programmes that have the potential to have a positive effect on seabird populations: the Mink Control Project, led by the SISI and the Orkney Native Wildlife Project, led by RSPB Scotland, NatureScot, and Orkney Islands Council for the eradication of non-native stoats from Orkney. Between spring 2018 and the end of 2020, 650 rafts and traps have been deployed and looked after by approximately 350 MCP volunteers (SISI, 2025). During this time, 371 mink were caught at 172 different locations. Approximately 75% of total mink captures occurred at 78 locations, several of which are on Scottish shores.

4.5.13. The Orkney Native Wildlife Project is equipped with a network of 8,000 humane lethal trap boxes (DOC 200 and DOC 150 traps), stoat detection dogs (a first for Europe), and local community support (Orkney Native Wildlife Project, 2025). The project employs approximately 40 staff which work alongside volunteers, tourism groups, farmers, schools, and land managers. Since 2019, the project has removed more than 6,000 stoats from Orkney and curlew, for example, have seen considerable recovery in areas where eradication has occurred (Orkney Native Wildlife Project, 2025). The project's aim is to make Orkney stoat-free by 2030.

ENGAGEMENT WITH NTS

4.5.14. The Applicant is progressing opportunities with NTS for biosecurity, predator control and/or eradication. Conversations with NTS to date have focussed on predator control delivered on NTS-managed islands. According to NTS, the trust owns and manages seven of the 25 priority islands in the UK for predator control. These include Fair Isle, Unst, and Yell. Fair Isle in particular has experienced a substantial decline in guillemot (-53%), kittiwake (-95%), puffin (-56%), and razorbill (-47%) and the presence of feral cats, house mice, wood mice, and European rabbit as biosecurity threats to seabird colonies has been recorded on this island

(Stanbury *et al.*, 2017). NTS islands were also the focus of the Biosecurity for Life project, such as Fair Isle, St Kilda, and the Treshnish Isles. As such, there may well be potential for a predator control programme to pick up where other biosecurity initiatives have left off due to funding termination (such as Biosecurity for LIFE, the funding for which ended in July 2023), as well as in new locations with a current predator problem. Table 4.13 provides an overview of the species of interest and their population trends between the Seabird 2000 count and the Seabirds Count 2015-2021 (Burnell *et al.*, 2023).

Table 4.13 Species and Population Trends at NTS Islands

Site	Designation	Species	% Change	Predators
Treshnish Isles	Treshnish Isles SPA	Kittiwake*	-27%	Rats, American mink, feral cats
		Guillemot*	76%	
		Razorbill*	6%	
		Puffin*	260%	
Staffa	Staffa SSSI	Puffin	94%	Potential for predators
Canna	Canna and Sanday SPA	Kittiwake	13%	Potential for predators
		Guillemot	-48%	
		Puffin	117%	
St Kilda	St Kilda SPA	Gannet	1%	Potential for predators
		Guillemot	-56%	
		Kittiwake	-89%	
		Puffin	-29%	
		Razorbill	-67%	
Fair Isle	Fair Isle SPA	Gannet	165%	Feral cats, house mice, wood mice, European rabbit
		Guillemot	-53%	
		Kittiwake	-95%	
		Puffin	-56%	
		Razorbill	-47%	

** Not a site designation feature.*

4.5.15. Applying the precautionary principle is crucial to successful predator control, as Early Detection and Rapid Response (EDRR) to invasive species increases the chances of successful predator control (Reaser *et al.*, 2020; Ahmed *et al.*, 2022). The longer predator management programmes are delayed, the greater the impact of predation and the higher the cost. The Orkney Native Wildlife Project illustrates the important effort required to eradicate non-native predators once they have established themselves on islands. Even where rodent populations are stable, there is a threat, as rodent populations have the potential to increase at a rapid rate when conditions are optimal, and if a response to their population growth is delayed, it may be challenging to establish a successful management programme. Any indirect effects from predator control should be reported and monitored, and decisions will be made in response to these indirect effects on species and habitats.

4.5.16. Ecological restoration has also been put forward by NTS as an area to explore to further support seabird colonies at their islands. Ecological restoration is the process of ecosystem or species population recovery following a period of degradation or destruction (VanderWerf *et al.*, 2023). In essence, restoration seeks to return a natural habitat or species population to its previous, or historical, condition. However, restoration may also include establishing a species in an area where it has not historically occurred, often because the original range is

no longer available or anthropogenic impacts have made it unsuitable (VanderWerf *et al.*, 2023). Where seabird restoration is concerned, actions include INNS eradication, improvement of nesting sites or the provision of ANS, and vegetation management, as well as the attraction of seabirds to a restoration site (VanderWerf *et al.*, 2023). Several projects of so-called 'active' seabird restoration involving purposefully attracting seabirds to new sites have been established over the last two decades (Jones and Kress, 2012; Zhou *et al.*, 2017; Spatz *et al.*, 2023). Over 800 projects have been identified using translocation and social attraction, covering almost 140 species, now available as the Seabird Restoration Database (Spatz *et al.*, 2023). These projects have been instrumental in helping to restore seabird populations following INNS predation, excessive hunting, oil spills, pollution, collisions, and human-wildlife conflicts. This measure is currently being trialled by NTS to complement the predator control programme and could be progressed as a compensation measure if appropriate.

SPECIES AND SITE SELECTION

4.5.17. The NTS islands where the species of interest are found are listed in Table 4.13 and these will serve as the main sites of focus for the implementation of the predator control programme. As can be seen, population declines are observed for many of the species, providing some confidence that the populations are being suppressed by a pressure, such as predation. In addition, this project aims to address predation of other seabird species (such as Manx shearwater, *Puffinus puffinus*) and as such, it is likely to be implemented at other NTS islands should the need arise. Potential benefits of predator control measures at all sites will be progressed and aligned with Caledonia and NTS prior to the delivery of the compensation package.

FREQUENCY AND DURATION OF THE MEASURE

4.5.18. The scalability of this programme and the constant threat of invasive mammalian predators reaching these islands suggest that this measure would remain in place for the duration of the Muir Mhòr Offshore Wind Farm's lifetime (approximately 35 years). The programme will adapt its approach over time to ensure maximum success, taking into consideration the data collected (i.e., number of predators eradicated), stakeholder views, and new invasions and responding to these appropriately. An adaptive management approach is essential to ensure success of the eradication or control measure, to ensure compensation is achieved when conditions change. Constant review, and where needed adjustment, of the programme is needed to ensure flexibility and success (Kelly et al., 2008) should post-implementation monitoring indicate the programme is unsuccessful or less successful than anticipated. Frequent monitoring of predators will help to assess the effectiveness of the measure to ensure predator control and determine whether changes in the approach may be required to achieve/improve eradication or control. Predator control measures will be adapted based on monitoring results and as new techniques and technology to control INNS and other predatory species are developed to ensure the most effective and efficient techniques are used to control predators, such as the use of AI or remote sensing.

DEMONSTRATION OF SUCCESS

4.5.19. Quantifying the benefits of predator control measures is difficult, as it is largely a preventative measure. The importance of a comprehensive, large-scale monitoring plan is recognised and will be provided alongside the compensation package. The Applicant is aware of ongoing strategic discussions regarding methodologies for measuring the success of measures and will continue to monitor and engage with these developments.

4.5.20. While the number of INNS species caught can provide an indicator of the impact of the measure, this is only feasible on islands where mammalian predators have been found. An effective predator control measure would couple EDRR with biosecurity measures to prevent

invasive predators from arriving to the islands in the first place. As such, coverage may provide a better indication of measure effectiveness. This is one of the metrics that was used by the Biosecurity for LIFE programme. Indeed, its project achievement report does not attempt to quantify how many individual seabirds were saved via its programme but rather focusses on how many seabird SPA islands had a biosecurity plan in place when the project began, versus upon its completion. Biosecurity for LIFE increased the proportion of seabird SPA islands with the resources necessary to manage biosecurity effectively from 25% to 95% (Biosecurity for LIFE, n.d.). Another metric used is the number of island residents, businesses, and visitors engaged by the project's awareness raising campaign, with over 3,400 island residents, conservation staff, and bird survey groups reached via talks from biosecurity officers and over a thousand people following the campaign via social media (Biosecurity for LIFE, n.d.). Area coverage, number of individuals reached, and number of predators humanely destroyed are all useful quantitative indicators for the success of this predator control measure. Regardless of the challenges, the predator control programme with NTS will endeavour to quantify the benefits by undertaking regular monitoring of predators and seabird populations to determine the benefits and inform any adaptive management that may be required.

LANDOWNER AGREEMENTS

4.5.21. At present, all interventions are expected to be carried out on NTS-managed islands. However, the appropriate landowner agreements will be secured as required should the programme expand beyond NTS management reach. The Applicant is working to develop relationships with local councils through NTS.

POSSIBLE EFFECTS OF PREDATOR CONTROL ON WIDER ISLAND ECOSYSTEMS

4.5.22. Any predator control programme should aim to minimise negative impacts to non-target species. As such, the use of poison bait is not recommended, as both the consumer of poison and its predators are susceptible to ailment or death, as species vary in their sensitivity to toxins (Glen *et al.*, 2007). Using humane, lethal trap boxes and detection dogs, such as is done in the Orkney Native Wildlife Project, can ensure non-target species are not negatively impacted by the predator control programme (Orkney Native Wildlife Project, 2025). Other methods, such as reducing the size of the entrance of trap boxes, can help prevent the accidental capture of non-target species such as rabbits, corvids, and gulls (Bell *et al.*, 2008). In addition, where breeding seabirds are concerned, should bait poison be used, it would be preferable to deploy poison during the non-breeding season.

4.5.23. Other seabird species outside of the species of interest listed above may benefit from predator control, such as Manx shearwater or European storm petrel (*Hydrobates pelagicus*). However, installing predator control equipment and fencing may disturb breeding seabirds in the same manner as described in Section 4.5. As such, carrying out construction during the non-breeding season is recommended. Care should be taken not to disturb or damage local flora or habitats during the deployment of equipment and construction of predator exclusion fencing, as well as any maintenance activities.

Table 4.14 NatureScot Compensation Checklist – Predator Control

Checklist Question	NatureScot Advice	Applicant Response
Is this measure technically feasible?	In principle, we agree that predator eradication is technically feasible. Further detail is required, including a full feasibility study, to satisfy that predator eradication at the specific sites proposed would be feasible.	The proposed predator control measures are technically feasible. The Applicant has reached a MoU with NTS and Caledonia to undertake a partnership to implement these measures. NTS is supportive of undertaking this work with the Applicant but must obtain final board approval before it issues a formal acceptance of partnership. Implementation of this measure is feasible, as there are many examples of similar successful schemes elsewhere in the UK. The potential use of EDRR measures and habitat restoration provide further confidence in the measure.
Is this measure financially viable?	The Applicant is willing to finance this work and an appropriate mechanism will need to be agreed.	The Applicant has committed to providing the necessary finance to carry out the disturbance reduction measures. The frequency and mechanism of payments will be discussed further with NTS. The Applicant will provide any required resources to NTS leading up to and following consent. The Applicant will provide funding towards a full-time position that will focus on the development of these measures. A pilot project will be developed later to explore the potential for this measure to be used for strategic compensation. This would allow for funding, organisation, implementation, and adaptive measurement to be ironed out on a smaller, more manageable, scale at first.
Is this measure legally securable?	Please note our advice above with respect to Berwick Bank and landowner agreement.	The Applicant acknowledges the importance of obtaining landowner permission in implementing these measures. The Applicant has begun progressing this measure in partnership with NTS. NTS owns and manages seven of the 25 priority islands in the UK for predator control. All interventions are expected to be carried out on NTS-managed islands. Therefore, the Applicant is confident that the measure is securable.
Is this measure deliverable?	In principle, we agree that predator eradication is deliverable, noting our advice above with respect to Berwick Bank and landowner agreement. Further detail is required, however, to satisfy that predator eradication at the specific sites proposed would be deliverable.	The Applicant has reached a MoU with NTS to undertake a partnership to implement these measures. NTS is supportive of undertaking this work with the Applicant but must obtain final board approval before it issues a formal acceptance of partnership. All interventions are expected to be carried out by experts on NTS-managed islands. Therefore, the Applicant is confident that the measure is deliverable.
Is this measure ecologically effective (i.e., sufficient)?	We agree there is ecological merit in predator eradication at seabird colonies. Further site-specific evidence is required, however, to establish which colonies and species would	The Applicant has demonstrated the need for predator control at seabird colonies and provided evidence of successful eradication efforts in Scotland. In partnership with NTS, who own seven of the UK's 25 priority islands, the Applicant is progressing this measure, supported by species trend data and predator presence assessments. Treshnish Isles,

Checklist Question	NatureScot Advice	Applicant Response
	benefit and the predicted effectiveness of the proposed measure.	Staffa, Canna, St Kilda, and Fair Isle have been shortlisted for potential implementation. Benefits, especially when combined with habitat restoration, can be measured through INNS removal rates and biosecurity effectiveness. A detailed feasibility study and monitoring programme will be conducted prior to implementation to confirm site suitability and track progress against compensation targets. The approach aligns with the Biosecurity for LIFE methodology, which measures success by the number of seabird SPA islands with biosecurity plans rather than individual birds saved.
Will this measure be effective before adverse effects arise?	The Applicant intends to implement the measure before the proposed development becomes operational. A detailed breakdown of the timescales for each stage of the proposed compensatory measures would have been useful to support this statement. However, it is noted that benefits are unlikely to be fully realised before impacts begin as depending on the seabird species in question it can take three to six years before additional breeding adults are delivered. This lagged response also poses issues when considering the trigger point for adaptive management.	The Applicant will fund these measures throughout the Project's lifetime and has already signed an MOU with NTS to begin implementation. Baseline data collection and feasibility studies may be required for two years prior to eradication. Some benefits, such as improved adult survival, will be seen immediately after an eradication. Productivity gains may take longer, as juvenile birds must reach adulthood, but measurable outcomes will demonstrate that any mortality debt can be repaid over time. A pilot project will be launched to assess the potential for strategic compensation, allowing funding, delivery, and adaptive monitoring to be tested on a smaller, manageable scale. Progress on this measure will occur in 2026 and therefore the Applicant is confident that the measure will be effective prior to operation. A detailed breakdown of the timescales for each stage of the proposed compensatory measures will be provided in the compensation package.

NEXT STEPS

4.5.24. To ensure the measure is developed and ready for implementation following consent, a clear way forward for this partnership to develop must be established. The Applicant commits to supporting NTS in the development of their programme by offering to provide the required resources leading up to and following consent. NTS are keen to collaborate with the Applicant and await board approval to formally accept the partnership.

4.5.25. A methodology statement detailing the implementation of the predator control programme is being developed by NTS with support from GoBe Consultants, the Applicant, and Caledonia as a part of a strategic compensation pilot programme.

4.5.26. Within the compensation package, the Applicant will provide a more detailed programme and further information on the potential benefits of predator control measures on NTS islands to provide confidence that the benefits will outweigh the project impacts.

4.6. CONCLUSIONS

4.6.1. The Applicant has proposed to carry forward two of the three compensation measures originally submitted in November 2024. Both measures have been revised and updated to include more detail on their development and implementation and both involve partnering with local organisations who have the expertise required to carry out the proposed measures. The partnerships are being finalised and their progress will depend on board approval for both SSC and NTS. All parties are committed to progressing these partnerships. However, if a partnership does not materialise, the Applicant can still implement the measures by scaling them up at alternative sites outside the partners' jurisdiction. For example, the disturbance reduction measure could target other sites and islands in the Firth of Forth and along the wider east coast. This could be achieved through on-the-ground actions and by promoting participation in initiatives such as the WiSe scheme.

4.6.2. Human disturbance has been linked to increased stress response and reproductive failure in many seabird species. As such, the target species (kittiwake, guillemot, razorbill, puffin, and gannet) stand to benefit from measures aimed at reducing levels of disturbance, particularly at their breeding sites. Disturbance reduction can also benefit the wider ecosystem as well, allowing non-target species the opportunity to carry out their lifecycle without being disturbed. The Firth of Forth is an ideal location to implement human disturbance measures and further these actions by working with local stakeholders (such as water sports organisations) to raise awareness and promote wildlife safety in this area. Partnering with WiSe will increase the reach of this initiative not only at the Firth of Forth, but around the wider eastern Scottish coast.

4.6.3. Predation of seabirds by INNS on islands is also a concern, and NTS have looked to the Applicant and Caledonia to support the development of a new predator control programme on their islands in the north of Scotland. This is a targeted approach aimed specifically at protecting NTS seabird islands from predation by INNS, but it has the potential to be scaled up to other, non-NTS islands elsewhere in Scotland where seabird colonies have been recorded. Similarly to the human disturbance measure, predator control can also benefit non-target species, such as storm petrel and Manx shearwater, which are also predated upon by INNS. Over the lifespan of the project (35 years), both measures have the potential to greatly benefit target seabirds and the wider ecosystem for generations to come.

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