Muir Mhòr Offshore Wind Farm

Derogation Case

Appendix D: Disturbance Reduction Evidence and Roadmap

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Glossary

Term	Definition
Array Area	The area in which the generation infrastructure (including Wind Turbine Generators and associated foundations and inter-array cables), Offshore Electrical Platform(s), and an interconnector cable will be located.
Developer	Muir Mhòr Offshore Wind Farm Limited.
Inter-array cables	Cables which link the wind turbines generators to each other and the Offshore Electrical Platform(s).
Interconnector cable	Cable which links the Offshore Electrical Platforms to one another, allowing for power to be transferred between the platforms.
Landfall	The area between Mean High-Water Springs (MHWS) and Mean Low Water Springs (MLWS) where the offshore export cables are brought onshore.
National Site Network	A National Site Network covering both land and sea, including the UK's inshore and offshore marine areas. This network encompasses existing SACs and SPAs, as well as new SACs and SPAs designated under the Habitats Regulations.
Offshore Electrical Platform (OEP)	Offshore platform consisting of High Voltage Alternating Current (HVAC) equipment, details depending on the final electrical set up of the Project.
Offshore export cable(s)	The subsea electricity cable circuits running from the Offshore Electrical Platform(s) to the landfall which will transmit the electricity generated by the offshore wind farm to the onshore export cables for transmission onwards to the onshore substation and the national electrical transmission system along with auxiliary cables such as fibre optic cables.
Productivity	Productivity and nesting refer to data and statistics concerning bird breeding performance, including metrics such as number of chicks produced per nesting attempt.
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.
Wind Turbine Generator (WTG)	The wind turbines that generate electricity consisting of tubular towers and blades attached to a nacelle housing mechanical and electrical generating equipment.

Acronyms

Term	Definition
AA	Appropriate Assessment
AEoSI	Adverse Effect on Site Integrity
CAFF	Conservation of Arctic Flora and Fauna
CE	Conservation Education
CIMP	Compensation Implementation and Monitoring Plan
EE	Environmental Education
HPAI	Highly Pathogenic Avian Influenza
MHWS	Mean High-Water Spring
MoU	Memorandum of Understanding
NGO	Non-Governmental Organisation
OEP	Offshore Electrical Platform
RIAA	Report to Inform Appropriate Assessment
RSPB	Royal Society for the Protection of Birds
SE	Standard Error
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSC	Scottish Seabird Centre
SUP	Stand-Up Paddleboard
WTG	Wind Turbine Generator
WTP	Willingness-to-Pay
UKC	UK Climbing

1. INTRODUCTION

1.1. PROJECT BACKGROUND

1.1.1. Muir Mhòr Offshore Wind Farm Limited (hereafter referred to as 'the Developer') is proposing to develop the Muir Mhòr Offshore Wind Farm (hereafter 'the Project'). The Project is made up of both offshore and onshore components. The subject of this document is the offshore infrastructure of the Project seaward of Mean High Water Springs (MHWS) which is hereafter referred to as 'the Proposed Development'.

1.1.2. The Muir Mhòr Array Area covers an area of approximately 200 km^2 and is located approximately 63 km east of Peterhead on the east coast of Scotland. The offshore infrastructure of the Proposed Development includes Wind Turbine Generators (WTGs) and associated floating foundations, the Offshore Electrical Platform(s) (OEP(s)) and associated foundations, the inter-array cables, an interconnector cable, offshore export cables and landfall.

1.2. DOCUMENT PURPOSE

1.2.1. This document supports the compensation aspect of a derogation case for the Proposed Development, should, following Appropriate Assessment (AA) by the Scottish Ministers, compensation be deemed necessary for impacts due to potential Adverse Effect on Site Integrity (AEoSI) on ornithological features of Special Protection Areas (SPAs). A derogation case has been prepared for northern gannet (*Morus bassanus*, hereafter referred to as gannet), puffin (*Fratercula arctica,* hereafter referred to as puffin), and common guillemot (*Uria aalge,* hereafter referred to as guillemot), and black-legged kittiwake (*Rissa tridactyla*, hereafter referred to as kittiwake).

1.2.2. The Ornithological Compensation Plan (Derogation Case: Appendix A, hereafter referred to as 'the Plan') sets out the predicted impacts on ornithological features, the selection process for the proposed compensation measures and the shortlisting of sites for implementation. The proposed compensation measures are predator control, artificial nesting sites, and disturbance reduction. This document focuses on disturbance reduction as a compensation measure for kittiwake, puffin, guillemot, and gannet.

1.2.3. A site investigation was carried out by the Developer on Scotland's east coast in July 2024 to identify pressures at various non-SPA seabird colonies. Details of these surveys can be found in Derogation Case: Appendix F – Compensation Measures: Site Investigation Report. The results of the site investigation helped inform the development of the proposed compensation measures set out in the Plan and this appendix.

1.2.4. This appendix reviews the evidence and potential for reducing the disturbance of seabirds, achieved by working with various stakeholders to implement measures to minimise impacts and improve seabird conservation. In addition, this document sets out an outline Compensation Implementation and Monitoring Plan (CIMP) and provides a roadmap for the design and delivery of the compensation measure.

1.2.5. Disturbance reduction was shortlisted following the identification of human-related activity that could potentially have a negative effect on seabird populations at non-SPA colonies. These activities were identified both via desk-based research and during the above-mentioned site investigation studies, in particular between Stonehaven and Aberdeen and at North and South Sutors on the Moray Firth. For more information on these field studies and for an overview of the ecology, conservation status, and threats and pressures at SPAs of the species targeted by these measures (kittiwake, puffin, guillemot, and gannet), please consult the Plan

(Derogation Case: Appendix A – Ornithological Compensation Plan) and Derogation Case: Appendix E – Compensation Measures: Site Investigation Report).

1.2.6. To support disturbance reduction, public outreach specifically has been taken forward as the potential compensation measure proposed (detailed in Section 2.5). It is worth noting that public outreach has become a key part of the upcoming biodiversity strategy (Scottish Seabird Strategy), the details of which (expected in 2025) can be found in Section 3. The implementation of outreach activities has experienced an increased interest from conservation organisations, thus providing opportunities to deliver such benefits as part of a compensation package by offshore wind farm developers.

2. EVIDENCE REVIEW: EFFECTIVENESS OF THE MEASURE

2.1. INTRODUCTION

2.1.1. A literature review was undertaken to find evidence for the use of disturbance reduction to support the conservation of target species (kittiwake, guillemot, puffin, and gannet). The literature included, but was not limited to, scientific journals, government reports, nature blogs, and Statutory Nature Conservation Body (SNCB) websites (such as NatureScot). In addition, SNCB stakeholders as well as other relevant organisations (i.e., conservation and recreational organisations) were consulted on to discuss possible disturbances to seabirds that could be addressed through the proposed measures.

2.2. RESPONSE TO HUMAN DISTURBANCE

2.2.1. Disturbance of seabirds from human activity takes place when stimuli such as people, pets, or boats are present near a seabird colony, and when this presence may be perceived as a predation threat (Frid and Dill, 2002). This can cause birds to spend more energy and time toward vigilance and fleeing than they would normally expend were they undisturbed (Price, 2008). Recreational activities, such as walking (including with dogs), hiking, horse-riding, birdwatching, and water sports, can all disturb nesting seabirds (Buckley, 2004).

2.2.2. Seabirds may display visible behavioural changes or non-visible physiological responses to human disturbance. This disturbance can negatively affect colonial seabirds, causing them to flush from (temporarily) or permanently abandon their nests in response to perceived threats (Carney and Sydeman, 1999). Responses to disturbance may also include disrupted incubation, aggressive behaviour towards conspecifics, alarm calls, interrupted feeding, or completely avoiding certain sites (Burger, 1981; Buckley, 2004). Flushing is more frequent in colonies that experience less frequent exposure to human presence. Indeed, Harris and Wanless (1995) found that kittiwake nesting success on the Isle of May remained unaffected by visitors due to the birds' habituation to repeated visual disturbances.

2.2.3. Reduced breeding success due to nest abandonment in response to human presence has been observed for seabirds across multiple sites (Hunt, 1972; Gillett *et al.*, 1975; Robert and Ralph, 1978; Burger, 1981; Fetterolf, 1981). Flushing birds from their nests can also expose eggs or chicks to harsh weather and result in chicks and eggs being displaced (Carney and Sydeman, 1999).

2.2.4. Despite nesting "out of sight" on narrow ledges along steep cliffs, cliff-nesting birds remain vulnerable to non-visible disturbances like noise, vibrations, and odours (Watson *et al.*, 2014). In burrowing or cavity-nesting seabirds, which are also often out of sight of humans during the nesting season, hatching success may remain unaffected by high levels of disturbance (Watson *et al.*, 2014). This depends on the species however (Burger, 1981), with tufted puffin (*Fratercula cirrhata*) thought to be more susceptible than European storm petrel (*Hydrobates pelagicus*) in their breeding success being impacted by humans, for example (Pierce and Simons, 1986). Where chick survival is concerned, Watson *et al.* (2014) found that nesting mortality was significantly higher in areas of increased human presence. In addition, where chicks survive, their development may be delayed (Pierce and Simmons, 1986).

2.2.5. When disturbances increase, birds may expend a significant amount of energy on anti-predator behaviours such as vigilance and avoidance (flushing), diverting energy away from parental duties or resource gathering, which in turn affects their survival and reproductive success (Buckley, 2004; Frid and Dill, 2002). During a study on chick growth and adult weight

loss, Sandvik and Barrett (2001) found that surveyor presence can negatively influence adult nest attendance and increase daily chick loss rates.

2.2.6. The presence of humans can also increase the number of avian predators to an area, as people generally carry food (Møller and Díaz, 2018), and increased human presence can thus lead to an increase in avian predation (Martin and Clobert, 1996).

2.2.7. Some bird species are more readily habituated to human presence than others and indeed may favour areas where humans are frequently present to deter predators (Covy *et al.*, 2019).

2.3. REPONSE TO RECREATIONAL DISTURBANCE

2.3.1. This section discusses the impacts on seabirds of disturbance originating from recreational activities specifically, using examples from various sites around the UK and globally.

LAND-BASED RECREATION

2.3.2. In areas where visitors are frequent, such as at St Abbs Head, a strong correlation was found between visitor presence during the breeding season and decreased productivity in kittiwake (Beale and Monaghan, 2004). On Great Saltee Island, gannet exhibited frequent flushing and failed breeding the closer visitors were in proximity to the nests (Allbrook and Quinn, 2021). Newton *et al.* (2015) revealed that human disturbance had a low to medium impact on all bird species on Lambay Island and a medium impact on those on Ireland's Eye, while walkers and dog-walkers had a particularly high impact on herring gulls. These results are supported by for example a 2015 study at Greyabbey Bay in Strangford Lough, which found that 33% of disturbance-related events were due to dogs being walked off-lead, and the response from coastal birds was more severe than for any other human activity (Matthews, 2016). On Skomer Island, visitors were found to have collapsed the nesting burrows of Manx shearwater (*Puffinus puffinus*) (Valentine, 1984), and on the Isle of May, puffin burrows were destroyed by visitors, guillemot eggs were lost due to visitors going up to and over the cliff edge, and visitors by boat were reported throwing stones at a shag (*Phalacrocorax aristotelis*) nest (Harris and Wanless, 1995). An individual was also observed to relocate great black-backed gull (*Larus marinus*) eggs between nests (Newton *et al.*, 2016).

2.3.3. More specifically, incidents involving birdwatchers and photographers have been recorded as sources of bird disturbance. Photographers are most likely to closely approach colonies compared to regular visitors (Allbrook and Quinn, 2020). There were 44 incidents of illegal or potentially harmful behaviour towards seabirds over a 20-day period during the peak birdwatching season on Hornøya, Norway (Aas *et al.*, 2023). Most of these incidents were linked to photographers who ignored signs prohibiting access, crossed over ropes, and caused general disturbance in proximity of nests. This supports the findings of Harris and Wanless (1995) on the Isle of May, where photographers disturbed cliff-nesting seabirds by leaving the path and going over the cliff edge. At Ireland's Eye, BirdWatch Ireland reported sightings of groups getting much too close to photograph great black-backed gull nests (Newton *et al.*, 2016). Watson *et al.* (2014) concluded that birdwatching pressure decreased individual fitness and reduced colony productivity by up to 1.6% for European storm petrel at Mousa island in Shetland.

2.3.4. Other land-based activities, such as rock-climbing, have been recorded as negatively affecting seabirds. Guillemots, as they nest on sea cliffs, are particularly at risk from rock climbing, abseiling, and coasteering activities (Huddart and Stott, 2019). Common ravens (*Corvus corax*) were shown to limit their movements and vocalisations in response to rock climbers (Covy *et al.*, 2020). Whilst there are few studies on the impacts of rock climbing on bird populations, a 2019 study by Covy *et al.* found that rock climbing was associated with lower avian community diversity at cliffs. Similarly, climbing has negatively affected peregrine falcon

(*Falco peregrinus*) reproductive success, with climbers causing the birds to flush from their nests, leaving eggs exposed to chilling and dehydration (Huddart and Stott, 2019).

WATER-BASED RECREATION

2.3.5. There are numerous examples of birds being disturbed by boats and other watercraft. Watercraft can alter bird behaviour, with tourist boats, for example, interrupting shag foraging activities and concentrating seabirds in areas with less boat traffic (Buckley, 2004; Velando and Munilla, 2011). Common terns at Mike's Island in New Jersey (USA) increased their energy expenditure through avoidance flights in response to speeding and circling watercraft, which Burger (2003) believe was linked to the decline in reproductive success observed in the five years leading up to the study. Additionally, boat-based wildlife tourism was linked to reduced foraging activity in an endangered shag population, displacing birds from critical foraging areas (Velando and Munilla, 2011).

2.3.6. At Gull Island, Newfoundland, Canada, a study investigated the behavioural effects of touring boats within 22 m of nesting auks (Hearne, 1999). All auks (guillemot, razorbill, and puffin) exhibited alarm behaviour and prevented activities related to breeding and survival across inshore waters with loud tour boats (human shouting and music) causing a greater response for razorbill (Hearne, 1999). This suggests that auks may be particularly sensitive to watercraft disturbance. At St Abbs Head there is concern over the boat presence triggering escape response and affecting nesting success of guillemot (Diele and White, 2018). As well, long-term exposure to watercraft has the potential to cause severe population declines, as seen in Norway, where the collapse of a guillemot colony was attributed to the increased presence of tourist boats near the colony (Barrett and Vader, 1984).

2.3.7. Another example shows Pigeon guillemot (*Cepphus columba*) may exhibit disturbance behaviour in response to watercraft, with a 6% probability of flushing when boats are 40 meters away and 2% when they are 50 meters away (Chatwin *et al.*, 2013). Pigeon guillemot were more prone to disturbance than other birds in the study, which included double-crested cormorants (*Phalacrocorax auritus*), black oystercatchers (*Haematopus bachmani*), and glaucous-winged gulls (*Larus glaucescens*) (Chatwin *et al.*, 2013). Furthermore, seabirds such as kittiwake are susceptible to human disturbance, particularly due to recreational activities linked to tourism (from small boat tours to large cruise ships) near their colony sites (Conservation of Arctic Flora and Fauna (CAFF), 2020). Marcella *et al.* (2017) determined that that 68% of Kittlitz's and marbled murrelets (*Brachyramphus brevirostris* and *B. marmoratus*) in Glacier Bay National Park and Preserve in Alaska (USA) were disturbed, either flushing or diving, when a cruise ship approached within 850 meters of the colony.

2.3.8. Slow watercraft such as kayaks or stand-up paddleboards (SUPs) can have a negative impact also. Studies have shown that guillemot experience disturbance when watercraft or boats are within 200 meters of a colony (Blanchard, 1994; Chardine *et al.*, 1998; Lavers *et al.*, 2020; Ainley *et al.*, 2021). A single kayak approaching a Brandt's cormorant (*Phalacrocorax penicillatus*) colony within 30 m was recorded to cause 600 cormorants to flush (Acosta *et al.*, 2008). SUPs can get very close to colonies inaccessible by land for extended periods of time (Baker *et al.*, 2021), and the presence of a human is more noticeable in the upright position when compared to kayaks or small boats, wherein people are sitting, and this standing position can trigger a predator response in seabirds (Kleiner and Hunziker, 2023). The response of birds to slow watercraft can be to dive or swim away rather than fly if the species of interest are capable of doing so (Bull and Rödl, 2018). However, Bull and Rödl (2018) concluded that birds reacted to SUP disturbances mainly by flying away over long distances, sometimes as many as several kilometres away from the source of disturbance, and displaced birds were more likely to desert their perch or raft when disturbed by a SUP compared to other slow water sports. The widely studied negative impacts of slow watercrafts such as canoes and water sports such as kite and wind surfing support the findings that SUPs have a particularly detrimental effect on birds (Bull and Rödl, 2018; Kleiner and Hunziker, 2023).

2.4. SITE INVESTIGATION

2.4.1. A short list of nine non-SPA sites, along on the east coast of Scotland (Stonehaven and Aberdeen and North and South Sutors coastline), where compensation could be implemented were identified in a desk-based study (see Derogation Case: Appendix A – Ornithological Compensation Plan and Derogation Case: Appendix E – Compensation Site Investigation Report for details). The opportunity for additional management is limited for designated ornithological features within SPAs compared to for the same seabird species at non-SPA sites, as such SPA sites these were screened out. The nine non-SPA sites were taken forward for initial site investigations. These investigations were conducted to gather information that would help assess the feasibility of compensation measures for the target species across the nine short-listed sites. Site visits were undertaken in July 2024 and included multiple site assessments of threats to seabird populations, including incidences of disturbance. Findings are reported in the subsections below.

CLAY SHOOTING

2.4.2. As part of the sites surveyed during the site investigations between Stonehaven and Aberdeen and at North and South Sutors coast, a non-SPA colony at Seal's Cove to Findon Ness was found to be in direct proximity to a clay shooting range. This could potentially have a negative impact on kittiwake and other breeding species at the site, as the clay shooting occurs on the cliff edge across from the colony. According to Labansen *et al.* (2021), gunshot noises may affect adult fitness, as repeated escape behaviour can have a negative effect on the fitness of breeding kittiwake and auks.

WATERCRAFT

2.4.3. At North Sutor, tour boats may increase disturbance of cliff-nesting seabirds such as kittiwake and guillemot. For example, EcoVentures offers regular trips to visit the seabird colony around North Sutor, including during the breeding season between April and July (EcoVentures, 2024). Film and photography charters are available as well. As set out in the literature review above, watercrafts, which include these tourist boats, jet skis, and kayaks, can negatively impact seabird breeding success (Buckley, 2004). The disturbance level from these vessels is dependent upon their proximity to seabird colonies and the duration of their presence. Cruise ships often pass through the Cromarty Firth by North Sutor on their way to Invergordon. In 2023, 129 cruise liners docked in Invergordon, with 116 visits in 2024, and over 90 cruise ship visits scheduled for 2025 (Invergordon Tourism Alliance, 2024). This suggests regular ship passages through the Cromarty Firth in proximity to the North Sutor colonies.

2.4.4. Several water sports routes around the sites investigated were identified using the open source heatmap provided by Strava (2024), wherein sport participants map their activity using GPS. SUPs were tracked within proximity of several colonies around Cove Harbour. As mentioned above, slow watercrafts such as SUPs and kayaks or canoes can not only get within close proximity, but are slow-moving and make frequent stops, which extends the duration of a visit and provides more prompts for flushing response (Stolen, 2003).

ROCK CLIMBING

2.4.5. The surveys also found evidence of rock climbing or abseiling near kittiwake and auk colonies at Findon Ness (Figure 2-1) and Cove Bay to Hare Ness. As previously stated, rock climbing can result in flushing and reduced nesting success, as well as changes in behaviour (Camp and Knight, 1998).

2.4.6. While footfall was limited during the surveys, this may be attributed to poor weather and the fact that surveys were carried out mid-week as opposed to during weekends, when there is

likely a much higher footfall by the cliffs. Nevertheless, evidence of rock climbing or abseiling was found.

2.4.7. A few non-SPA colonies on the east coast of Scotland are located on or near cliffs which are used for rock-climbing or abseiling. The now-extinct Burnbanks colony was in close proximity to Junkyard Wall, a rock-climbing site (ScottishBloc, 2024). Surveyors reported rock-climbing paraphernalia near colonies at Findon Ness (Figure 2-1) and Cove Bay to Hare Ness.

Figure 2-1 Evidence of rock-climbing activity at Findon Ness. Photo taken on 9 July 2024.

2.4.8. Cove Climbing is a local rock-climbing organisation that provides guided rock climbing and other tours. Their website features photos of rock-climbers on cliffs near possible kittiwake nesting ledges and as such there may be a benefit to working with organisations such as these to minimise human disturbance at these sites. Whilst the aforementioned photos cannot be reproduced in this document, they are available online[1]. Both photos were taken at sites near Aberdeen.

2.5. SUGGESTED MANAGEMENT

2.5.1. This section reviews the evidence of suggested measures that are suitable to reduce the disturbance activities and increase productivity and survival rate of target seabirds at the non-SPA sites surveyed.

[1] Photographs available at https://coveclimbing.co.uk/wp-content/uploads/cache/2022/07/Guided-Climbing-4-scaled/509860417.jpg and https://coveclimbing.co.uk/wp-content/uploads/2022/04/imagesizereducer_resized-1-773x1024.jpg. Accessed November 2024.

EVIDENCE OF WATER-BASED ACTIVITIES REDUCTION MEASURES

2.5.2. It can be assumed that disturbances to birds from SUP or other slow watercraft largely occur unintentionally and may be due to lack of awareness (Bull and Rödl, 2018). As such, awareness raising and working with water sports groups or organisations to sensitise recreational activity participants to nature conservation issues may help prevent seabird disturbances (Bull and Rödl, 2018). Indeed, changes in the behaviour of water sports enthusiasts has been shown to effectively reduce the frequency of disturbance events (Sutherland *et al.*, 2017). Other methods include better signposting to inform waters sports practitioners and identifying ecologically safe entry and exit points for watercraft (Bull and Rödl, 2018). As evasive behaviour by seabirds can occur at distances between 200 m and 500 m from birds (Bull and Rödl, 2018), creating a buffer zone could prevent such responses. Bull and Rödl (2018) recommend that area-specific effects and flight distances, flock sizes, target species and the area-specific disturbance levels always be considered when designing buffer strips. To limit the frequency of disturbance, a limit on the maximum simultaneous number of watercrafts within proximity to known colonies could also be established, as well as speed, temporal, or spatial restrictions such as a buffer zone (Bull and Rödl, 2018). These restrictions may be legally established by the responsible authority or administration or via voluntary agreements (Sutherland *et al.*, 2017).

2.5.3. The “Aufs Wasser mit Rücksicht” (English: *Consideration on the Water*) campaign organised by the NGO (Non-Governmental Organisation) “Natur und Freizeit” (English: *Nature and Freedom*) was designed to raise awareness amongst water sports enthusiasts and sensitise them to possible conflicts with nature, promoting nature-friendly (and bird-friendly) behaviour (Kleiner and Hunziker, 2023). Following pilot programmes on upper Lake Zurich and Lake Geneva, where posters were put up at lake shores and leaflets were distributed in German and French, guidelines to encourage SUP users to change their behaviour were posted on the campaign website. These guidelines included staying 100 m away from breeding areas (where possible), keeping a large distance from bird gatherings as disturbances are possible from 1 km away, and respecting the boundaries of protected areas (Kleiner and Hunziker, 2023). Analysing the behavioural response of SUP users to the campaign via questionnaires, Kleiner and Hunziker (2023) found that the poster/leaflet campaign had a positive effect on SUP user behaviour and suggest that because information is rarely obtained in advance, SUP users should be informed on site or when buying or renting equipment.

2.5.4. For ecotourism boating activity, suggested management such as restricting the number of boats allowed in a protected area was effective at reducing disruption to foraging activity for European Shag in Cies Islands, north-western Iberia (Velando and Munilla, 2011). Breeding seabirds can benefit from limiting water-based activities distance to colonies during the breeding season to reduce stress responses (Chatwin *et al.*, 2013)

EVIDENCE OF ROCK-CLIMBING REDUCTION MEASURE

2.5.5. Where rock climbing is concerned, British climbing associations have provided members with seabird identification information and guidelines to minimise disturbance, in response to the frequent encounters between climbers and seabirds at these sites (UK Climbing (UKC), 2019). The regularity of these interactions has led to seasonal closures of certain cliffs during the breeding season (Huddart and Stott, 2019). Indeed, Holzschuh (2016) suggests that rock climbing may accentuate adverse factors and therefore cause harm to the colony, such as where unattended nests are left vulnerable to predation. For rare species especially, a simple measure could be to identify nesting sites of said species and implement a temporary ban on rock climbing or coasteering during the breeding season, allowing activities to resume in the overwinter period (Holzschuh, 2016). More research is needed to better understand the extent of buffer zones needed around the nests of target species, but the literature supports the need

for such zones to prevent flushing and other anti-predator behaviour (Holzschuh, 2016; Kleiner and Hunziker, 2023).

EVIDENCE TO SUPPORT EDUCATION AND OUTREACH FOR CONSERVATION

2.5.6. The measures above demonstrate the need for public outreach programmes to raise awareness on the potential disturbance that water-based and rock-climbing activities can cause to those who partake in these activities and other member of the public. The implementation of outreach activities is in line with the upcoming Scottish Seabird Strategy and has been supported by Royal Society for the Protection of Birds (RSPB) Scotland as a compensatory measure alongside other measures for projects (see Section **Error! Reference source not found.**). As such, public education and outreach programs have been selected as the compensation measure to be implemented for the Proposed Development.

2.5.7. Whilst difficult to quantify, 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; Howe *et al.*, 2012; Curti *et al.*, 2010; 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).

2.5.8. These data, however, do not quantify direct benefits to target species. As such, a mixed methods approach must be used, wherein participant surveys and interviews provide behavioural data (both quantitative and qualitative), and subsequent colony monitoring can record changes in disturbance and subsequent effects on colony health. Including quantitative parameters in any study of the impact of public awareness on recreational practices to reduce disturbance of seabirds, where possible, will help determine the effects on seabirds of the implemented disturbance reduction compensation measure.

2.5.9. Examples of such semi-quantitative approaches to monitoring the effects of the implemented measure come from two separate studies on the impacts of SCUBA divers on coral reefs (Medio *et al.*, 1996; Camp and Fraser, 2012) in Egypt and the USA, respectively, found that CE dive briefings before submersion reduced diver contact with reef substrates (i.e., live corals). Medio *et al.* (1996) recorded a decrease of diver contact with corals from 1.4 to 0.4 contacts per diver per seven-minute observation (where the rate of contact before briefings was estimated at approximately 500 potentially damaging contacts per day at heavily frequented sites). Similarly, Camp and Fraser (2012) found that 97% of divers made physical contact with the reef during any given dive, and that divers who were briefed by their dive operator pre-submersion had a significantly lower impact on reefs, with 0.16 ± 0.08 (mean ± Standard Error (SE)) touches per minute compared with 0.37 ± 0.06 (mean ± SE) for charters without conservation briefs. This example supports that communicating with recreational activity practitioners about the impact of their activity can demonstrably, and quantifiably, benefit the target species, and thus, such outreach practices could feasibly reduce disturbance and increase productivity in seabird populations by reducing the risk of flushing or nest abandonment (see further studies below).

2.5.10. 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). Working with local communities to reduce perceived threats from wildlife can also help promote their survival, such as for 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).

2.5.11. This educational approach has also been highlighted in Mozambique, where children's education is the focus of NGO Love The Oceans, which teaches marine resource management at two local schools to help cultivate the importance of sustainable resources to the next generation of fishers (Love The Oceans, 2024). The organisation has found that much of what is taught in these lessons is discussed at home with the children's families, reaching a much greater audience and providing more benefits to the local communities (Love The Oceans, 2024). 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).

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

2.5.13. Preventative measures include the presence of wardens or rangers. According to Medeiros *et al.* (2007), the significant increase in nesting success of little tern following the implementation of preventative measures is attributed to a decrease in predation of breeding birds (which may be significantly increased due to human disturbance) and an increase in body condition or fitness (as disturbance responses involve high energy expenditure). The presence of rangers can also increase environmental awareness, as talking to rangers can lead to increased understanding and behavioural changes amongst visitors (Major and Smith, 2022). However, engagement rates are often low and increasing interactions between visitors and rangers is crucial to increase conservation awareness and ensure behavioural changes (Major and Smith, 2022).

2.5.14. 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 are often lack funding and resources (Arkema *et al.*, 2006; Koontz and Bodine, 2008), so citizen science programmes (largely run by volunteers) may be a suitable tool to support seabird populations. Recreation practitioners could be trained to collect data, such as Seasearch, wherein divers are trained to collect biodiversity data on dives (Seasearch, 2024). Citizen science programmes have demonstrated success in research and monitoring for conservation (Cigliano *et al.*, 2015; Robinson *et al.*, 2021). Monitoring is key to conservation, as it is impossible to protect what is unknown (Schéré *et al.*, 2023; Giakoumi *et al.*, 2024).

3. SCOTTISH SEABIRD STRATEGY

3.1.1. The upcoming Scottish Seabird Strategy, expected in 2025, will address critical seabird declines due to issues like climate change, invasive predators, food shortages, and human impacts, especially from fishing and renewable energy projects. Initiated in response to alarming seabird declines (70% of species in Scotland are currently declining) the strategy is anticipated to be comprehensive, targeting habitat protection, bycatch mitigation, food supply improvements, and resilience against disease outbreaks such as highly pathogenic avian influenza (HPAI). This strategy forms part of Scotland's broader commitment to integrating biodiversity conservation with climate goals, ensuring seabird populations are safeguarded while pursuing sustainable energy goals.

3.1.2. The plan will advocate for stricter protections, such as reducing industrial fishing for species that seabirds depend on and firmly tackling bycatch. Additionally, the strategy will prioritise responsible placement and design of offshore renewable projects to reduce their ecological impact on seabirds.

3.1.3. Conservation organisations like RSPB Scotland have urged the government to include within the strategy provisions for managing human disturbances (along with predator control, habitat protections, and bycatch reduction) as part of a more comprehensive conservation approach, as those provisions are seen as crucial to reversing the declines in seabird populations in Scotland.

3.1.4. The exact framework for implementing these recommendations will likely be detailed further upon the full release of the Scottish Seabird Strategy.

4. IMPLEMENTATION

4.1. INTRODUCTION

4.1.1. This section serves as an outline CIMP, which details how the compensation measure of education and outreach activities for all target species at non-SPA colonies on Scotland's east coast can be implemented and monitored. This section also details the benefits of disturbance reduction measures at the selected sites and how these can address compensation requirements for all target species.

4.2. PROPOSED COMPENSATION MEASURES

4.2.1. The site surveys across the east coast of Scotland reveal a multitude of potential human disturbance stimuli to seabirds at Seal's Cove to Findon Ness, North Sutor, Findon Ness, Cove Bay to Hare Ness, and Burnbanks. Threats at these sites include clay shooting range, boast tourism, water-sport activities as well as rock climbing. The primary proposed measure for this document is the use of education and outreach programmes involving engagement with the general public and disturbance activity practitioners (Blanchard and Monroe, 1990; Byers, 2003). Installing signage and employing wardens or rangers can also be implemented and was shown to be successful in reducing disturbance through educating the public (Medeiros *et al.*, 2007; Marschall *et al.*, 2017; Donnelly *et al.*, 2021; Rice *et al.*, 2023). The combination of approaches (e.g. signage as well as education by wardens) within public outreach programmes can provide a cumulative benefit to seabird populations at the non-SPA sites.

4.2.2. The delivery location for this education and outreach measure will be defined by the Developer in collaboration with relevant stakeholders. The Developer is actively pursuing opportunities to implement compensation across multiple surveyed colonies (Seal's Cove to Findon Ness, North Sutor, Findon Ness, Cove Bay to Hare Ness, and Burnbanks). In addition, there is scope for supporting disturbance reduction measures in other parts of Scotland through partnerships with conservation and recreation organisations (e.g., in the Firth of Forth through the Scottish Seabird Centre).

4.3. MONITORING

4.3.1. Quantifying the effects of human disturbance can be challenging, but the effectiveness of several methods has been highlighted in Sections 2.1 and 2.5 and monitoring can provide both qualitative observations and quantitative data to understand changes in disturbance and in turn seabird colony health where the disturbance reduction compensation measures has been implemented (e.g. signs installed, education programme commenced, outreach warden employed). The following data can be quantified and collected for monitoring purposes:

- Quantifying current population size/productivity;
- Quantifying the baseline of disturbance (e.g., current human distance to nests, observations on behaviours near nests);
- Quantifying the reduction in disturbance (e.g., human distance to nest after measure implementation, observations on behaviours near nests); and
- Monitoring, and if feasible quantifying changes to seabird behaviour (e.g. number of flushing evets), breeding performance, and populations.

4.3.2. Monitoring efforts should include productivity tracking to attempt to assess the population-level effect of these measures. This is typically done by measuring breeding success through viewpoint studies, with daily checks for nest failure (Beale and Monaghan, 2004). It is crucial the monitoring study has an appropriate control group, and to observe study plots both near and distant from high visitor traffic areas to identify any differences in breeding success before and after mitigation efforts are introduced (Watson *et al.*, 2021). It should be noted that establishing a causal link between disturbance measures and breeding performance and resulting population-level responses will be challenging due to the ecological complexities of any such data, but a qualitative narrative to observed benefits can be provided.

4.3.3. Monitoring for the reduction in activity disturbance can be done through independent monitoring of human behaviour by an observer, but also for example via data collected by water sports enthusiasts (e.g., observations in changes in seabird flushing following behaviour modification) and questionnaires to establish any behavioural changes. Where a ranger or warden is hired, recording the number of interactions with visitors and identifying any potential disturbances and addressing them accordingly can provide additional information on the effectiveness of these programmes, more so if a link can be made between the number of interactions and reduced disturbance.

4.3.4. Similarly, educational outreach programmes to local communities or visitors can be monitored via pre- and post-intervention questionnaires to identify any behavioural changes that arise following the intervention. Willingness-to-pay (WTP) could also be used to quantify how individuals value conservation - is a contingent valuation method used to determine how much money a person would be willing to spend on conservation for a given target (e.g., a specific species, a group of species, a national park, etc.) and thus provides a useful metric to elicit visitor attitudes towards conservation (Ren *et al.*, 2022). WTP can also be used to assess the effectiveness of the public awareness component of the measure, where higher WTP indicates a more successful educational outreach programme (Tianyu and Meng, 2020).

4.3.5. Monitoring the effectiveness of the actions proposed relies on the cooperation and collaboration of several stakeholders. Quantitative and qualitative data will be collected to inform adaptive management and determine whether the current actions are effective or need reviewing.

4.3.6. A full outline of the proposed monitoring approaches will be detailed in the CIMP upon finalisation of the proposed measure(s).

4.4. FEASIBILITY

4.4.1. The proposed compensation measures of outreach and education can be implemented using simple approaches (signage, outreach), as per the evidence above. It is thus considered highly feasible. The measure relies on effective collaboration with various stakeholders, from SNCBs to sports and recreation associations. Putting the necessary time and resources into supporting the initiatives described above can help ensure that the methods are as effective as possible at protecting seabird populations, but the level of cooperation and collaboration from partners, and compliance by the public will influence the outcomes on seabirds achieved.

4.4.2. As set out through the evidence provided in this document, the implementation of compensation measures to reduce recreational disturbance has the potential to benefit target species. These measures are particularly effective at sites experiencing high visitor pressure. Partnering with already-existing programmes or organisations such as the Scottish Seabird Centre (SSC) and supporting their actions makes this measure less challenging to implement than setting up a campaign or programme from scratch. Monitoring of such a method can be carried out via partner organisations or local ornithologists during the breeding season, when human activity is high.

POTENTIAL BENEFITS

4.4.3. Reducing disturbance to seabirds both during and between breeding seasons has the potential to increase productivity through mitigating stress factors that could cause flushing or nest abandonment where recreational activity is a source of disturbance. As demonstrated in this document, several methods have successfully been carried out to prevent the degradation of habitats and disturbance of a variety of species, including seabirds. Productivity can also be improved as evidenced by Beale and Monghan (2004). The study of human disturbance impacts on kittiwake and guillemot productivity at St Abbs Head revealed that an increased visitor number by 9% can decline the nesting success to 29% and 66% (Beale and Monghan, 2004). Reducing the number of visitors by half can result in 96% and 87% nesting success for kittiwake and guillemot, respectively (Beale and Monaghan, 2004).

4.4.4. As such, based on the evidence collated here, the Developer concludes that the implementation of measures to reduce disturbance is highly feasible and has strong potential to benefit seabirds.

4.5. COMPENSATION CHECKLIST

4.5.1. To ensure the Scottish Minister have the information needed to inform their decision on the appropriateness of outreach and educational programme as a compensation measure, a checklist of the relevant guidance and how it is met by this roadmap is presented in Table 4-1.

Table 4-1 Compensation measure checklist.

Checklist Question	Explanation
Is this measure technically feasible?	Yes. This measure has been implemented across many colonies across the UK and further. The Developer will pursue the development of education and outreach activities independently with relevant stakeholders, and through collaboration by providing funding to the SSC.
Is this measure financially viable?	Yes. The Developer is committed to securing funding for disturbance reduction measures and considers these measures affordable. Therefore, the overall measure is financially feasible.
Is the measure legally securable?	Yes. The measure has been implemented across Scottish islands, showing it is legally feasible. Key consents and legal requirements for the implementation of these measures will be progressed by the developer.
Is the measure deliverable?	Yes. The measure has been evidenced to be deliverable and successful for the target species. It can feasibly be delivered and maintained for the lifetime of the project.
Is this measure ecologically effective (i.e. sufficient)?	Yes. This measure has strong ecological evidence to suggest success to kittiwake, auk and gannet colonies. Therefore, is ecologically effective and will maintain the coherence of the network.
Will this measure be effective before adverse effects arise?	Yes. Compensation will be implemented and active before impacts from the Proposed Development have occurred.

5. ROADMAP FOR DELIVERY

5.1. PARTNERSHIP WITH THE SCOTTISH SEABIRD CENTRE

5.1.1. The SSC is a marine conservation and education charity with an award-winning visitor centre located in North Berwick. The SSC runs 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 a monitoring programme on gannet at Bass Rock. In addition, the SSC offers a core programme of indoor and outdoor workshops for primary and secondary school pupils. The SSC also delivers several education and outreach programmes, including through workshops with primary schools, engagement at wildlife clubs and presence at festivals.

5.1.2. The Developer is working with SSC to develop a tailored education and outreach programme as the compensation measure for the Project. For that purpose, SSC have proposed a 'Campaign Approach' targeted towards visitors and tour operators through outreach and educational programmes. This will be a data and evidence driven approach to aim for the most positive possible outcome to seabird colonies. The approach would involve the education of visitor and tourism companies on and surrounding the Firth of Forth, a hotspot for tourism, alongside other interventions to support seabirds such as engagement with fishers, and to specifically address the need for compensation where gannet are concerned, the SSC would monitor the impact of visitor disturbance on the productivity of gannet at Bass Rock.

5.1.3. The Developer is in the advanced stages of finalising this measure with SSC, and the proposal has been received for the above-mentioned campaign. The proposal contains clear details on how the campaign will support seabird conservation in the Firth of Forth and, as applicable, Scotland-wide. A letter of understanding has been signed (see Annex A) in anticipation of the memorandum of understanding (MoU), which is currently being drafted by the Developer. There is thus high confidence in the deliverability of this measure.

5.1.4. The Developer aims to implement the disturbance reduction programme in advance of the Proposed Development becoming operational.

5.2. COMPENSATION QUANTUM

5.2.1. The maximum predicted impact of the Proposed Development is 37.24 adult kittiwake, 10.2 adult puffin, 62.24 adult guillemot, and 10.6 adult gannet from impacted SPAs per annum (see Derogation Case: Appendix A – Ornithological Compensation Plan). For a measure to compensate at a 1:1 ratio for the impacted breeding adults, a minimum of that number of additional breeding adults recruited into the chosen non-SPA breeding population per annum is thus required, respectively. The key benefit of the delivery of the disturbance reduction compensation measure is the recovery or continuation of colony growth for the targeted seabird species. In addition, there is an opportunity for target seabirds to expand their range, density, and allow recruitment of species into the colonies in or around the islands. As this measure has the potential to increase breeding numbers for all target seabird species, as illustrated by the evidence presented, this measure is likely to deliver compensation at a ratio of well over 1:1.

5.2.2. It is noted the target seabird species first breed at around four to six years of age (depending on the species), Therefore, following implementation of the compensation measure it will take four to six years before additional breeding adults are delivered, however this ecological deficit (mortality debt) accumulated during the first years of operation will be vastly outweighed by the gains over the operational lifetime of the Proposed Development.

5.2.3. Any change in the colony's size and/or growth rate will be dependent on for example the food supply, nesting space available and the health of the colony, and quantifying the exact benefits delivered by the implementation of this measure is thus difficult given the ecological complexities. However, benefits can be captured semi-quantitatively from the monitoring of visitor presence and seabird colony size and breeding performance.

5.3. CONSULTATION

5.3.1. Prior to application, the selected compensation measure was consulted on with local and national stakeholders, such as NatureScot and the RSPB. A summary of exchanges with stakeholders on the subject of human disturbance issues can be found in Table 5-1.

5.3.2. The Developer is collaborating with the SSC to provide funding support to develop and deliver its outreach and education programmes across the Forth Islands. Further discussions are envisaged with other organisations such as the Royal Yachting Association, Mountaineering Scotland, or Paddle Scotland to target and develop outreach programmes for people who participate in those activities.

Table 5-1 Details of stakeholder engagement about human disturbance and public outreach.

Stakeholder	Communication	Date(s)	Topic(s) of discussion
NatureScot	Meeting	08/08/2024; 10/10/2024	Ornithological surveys and their results were presented to NatureScot, and a subsequent meeting discussed potential compensation measures.
RSPB	Meeting	18/06/2024	Ornithological surveys and their methodology were presented to the RSPB.
Highland Bird Ringing Group	E-mail	26/04/2024 to 01/05/2024	Conservation around potential threats to seabird colonies at North and South Sutor.
Forth Seabird Group	E-mails, Meeting	22/08/2024 to 09/10/2024	Conversation around human disturbance at the Firth of Forth Islands. Meeting on 09/10/2024.
SSC	E-mails, Meetings	04/09/2024 to 21/11/2024	Conversations around educational outreach and public engagement. Meetings on 04/09/2024 and 31/10/2024. A letter of understanding (Annex A) for a partnership between the Developer and the SSC has been signed.
National Trust for Scotland	E-mail	19/08/2024 to 24/09/2024	Current seabird conservation initiatives carried out by the National Trust for Scotland were discussed.
Scottish Wildlife Trust	E-mail	26/09/2024 to 30/09/2024	Current seabird conservation initiatives carried out by the Scottish Wildlife Trust for Scotland were discussed.

5.3.3. Post-consent, the Developer will create a steering committee to support the Developer in defining the details of site refinement, implementation, monitoring, maintenance, reporting, and other measures necessary for the successful execution of the measure, as well as supporting decision-making throughout compensation delivery. Core members will likely include any relevant SNCBs, as well as site owners and local council(s). These discussions will inform the Compensation Implementation and Monitoring Plan (CIMP) and support the implementation of the measure.

5.4. ADAPTIVE MANAGEMENT

5.4.1. An adaptive management approach is essential to ensure success of disturbance reduction 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.

5.4.2. Adaptive management will thus be applied as a part of the package of compensatory measures to ensure delivery of disturbance reduction. Frequent monitoring of the outreach and education programme will help to assess the effectiveness of the measure and determine whether changes in the approach may be required to achieve/improve outreach and education. When there is clear evidence that the measure is not being delivered, adaptive management will then be pursued. Management of the measure will adapt to the results of the monitoring report for each measure to address any shortcomings or issues that arise in the implementation of each measure.

5.4.3. In addition, it should be noted that pursuing a suite of different compensation measures, as proposed by the Developer, adds further resilience to the compensation provision.

5.4.4. Adaptive management will not be employed if variables outside of the Developer's control are evidently responsible for the lack of success (for example climate change or lack of prey).

HIGHLY PATHOGENIC AVIAN INFLUENZA

5.4.5. The impact of HPAI should be acknowledged, as it poses a threat to seabirds, mammals, and humans and is a public health issue. Additional public outreach and educating the public on HPAI is needed to help prevent the spread of the virus.

5.4.6. The most recent outbreak of HPAI emerged in 2020 in the form of HPAI H5N1 clade 2.3.4.4b virus and was first reported in gulls and gannets, but the initial impact on populations was minimal (Falchieri *et al.* 2022). The epidemic became widely known in spring 2022, when it spread to marine and coastal birds. Gannet colonies experienced a decline of 25% in the UK (Tremlett *et al.*, 2024). At least 760 kittiwake deaths were recorded in Scotland in 2022, while a minimum loss of 1,908 guillemot was recorded for Scotland and 3,775 guillemot in England in 2022, including adults, juveniles and un-aged birds (Tremlett *et al.*, 2024).

5.4.7. HPAI spreads between birds via bodily fluids such as saliva, secretion, and faeces (Charostad *et al.*, 2023). The virus can also be transmitted through organic materials like soil and nesting materials and can remain inactive in freshwater at low temperatures for several months, as such increasing the risk of waterborne transmission to aquatic birds (NatureScot, 2024b). Migratory birds carry the virus along their migration routes, and this is believed to be the cause of the virus's arrival into the UK (NatureScot, 2024b). HPAI can cause a range of lethal and sublethal effects in birds, including haemorrhaging, respiratory issues, unresponsiveness, swelling of the head, musculoskeletal twisting, and loss of limb control (RSPB, 2024).

5.4.8. Site managers are encouraged to take action to limit the spread of HPAI by human activities to improve the chances of bird survival. NatureScot (2024b) recommends warning visitors about the potential presence of HPAI and reminding them not to handle dead or sick birds.

Other actions include providing local advice to visitors to minimise disturbance of birds, encouraging everyone to clean and disinfect footwear before and after visiting seabird colonies or islands, and reporting sightings of dead or sick birds to the GB Dead, Wild Bird Surveillance Scheme (NatureScot, 2024b).

5.4.9. Should a continued or further outbreak take place over the lifetime of the measure, education of the spread of HPAI can be employed (as part of the measure or adaptive management) to aim to reduce impacts on seabird populations.

5.5. KEY CONSENTS AND LEGAL REQUIREMENTS

5.5.1. The Developer is confident that this measure is legally securable. The Developer will liaise and work with relevant landowners to secure any necessary rights and/or permissions to implement this measure. Post-submission, the Developer will work with the steering group to consult on final site selection and formalise all relevant contracts and permissions, including formal agreements, contracts, or land purchases. Consultations with the steering committee, as well as any and all processes and outcomes, will be recorded in the CIMP.

5.6. STRATEGIC COMPENSATION

5.6.1. Strategic compensation involves developers working together, potentially with government, to deliver a joint, wide-reaching compensation measure or series of measures which compensate for the predicted impacts of all projects part of the strategic compensation initiative. This may include the delivery of compensation through the planned Marine Recovery Fund, a strategic fund for the UK which developers pay into to discharge their compensation obligations.

5.6.2. The Developer plans to continue to be involved in the development of strategic compensation and is considering the potential for strategic compensation to be used i) in combination with, ii) instead of, or iii) as adaptive management for, the project level compensation proposed in the derogation case for the Proposed Development. In addition, the developer is actively engaging with other developers to explore the potential to collaborate and jointly deliver compensation.

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7. ANNEX A

LETTER OF UNDERSTANDING

MUIR MHÒR
OFFSHORE WIND FARM
A joint venture between Fred. Olsen Seawind & Vattenfall

21/11/24

Susan Davies
Scottish Seabird Centre
North Berwick
EH39 4SS
Tel: 01620 890202

Subject: Muir Mhòr – Conservation of seabirds – awareness raising campaign

Dear Ms. Davies,

Further to previous conversation, Muir Mhòr Offshore Wind Farm Limited understands the following in relation to the proposal that Muir Mhòr will support the funding of the Scottish Seabird Centre's Conservation of Seabirds awareness raising campaign. If both the parties decide to move forward with the cooperation, a formal agreement shall be entered into by the parties.

Specifically, the proposed study and awareness campaign would:

- Direct research effort to monitor the effect of fishing and tourism vessels and direct visitor footfall on seabird colonies (e.g. assessing through observation changes in behaviour from different vessel types, speed and proximity, time of day and season, and visitor footfall from agreed vantage points);
- Trial monitoring the impact of visitor disturbance on the productivity of the Northen gannet colony on the Bass Rock through comparison of nesting sites with visitor access and those which are undisturbed;
- Create a campaign, using engagement techniques and communications, to target users of the sea (specifically recreational and fishing interests) around the Firth of Forth to:
    - Stakeholder mapping of the main users of the sea and an assessment of their current awareness of seabird colonies and disturbance risk;
    - Raise awareness of seabird lifecycles and the specific periods where disturbance occurs – breeding and over-wintering;
    - Tailor to the specific species, colonies and type of user;
    - Produce materials which would raise awareness for school-aged children of the importance of seabirds in the Firth of Forth and the effect of disturbance;
    - Engage fishing interests via local harbour Trusts and inshore fisheries group;
    - Increases the number of tour operators and other users of the sea who are WiSE-accredited.
    - Identify community/user champions who would reinforce/amplify the campaign messages.

Although targeted around the Firth of Forth, the lessons learnt from the campaign could be applied to other geographical areas (especially East Coast seabird colonies), reducing overall levels of disturbance and increasing the overall resilience of seabirds in the face of wider pressures.

Muir Mhòr understands and acknowledges that this partnership is contingent on the approval of NatureScot and the Marine Directorate – Licensing Operations Team (MD-LOT). Should the partnership be approved, a budget for the measure will be devised to support the implementation of the underpinning research and awareness raising campaign, taking into consideration the following requirements from the Scottish Seabird Centre to effectively carry out said campaign:

- Support the production of educational materials;
- Provide marketing and communications resources to for stakeholder engagement and feedback evaluation;
- Provide resources for field cameras to assist with monitoring;
- Provide travel and subsistence costs, including boat hire for survey where appropriate;
- Support the costs associated with project management, delivery and expert science advice to structure the survey method, data collection and feedback mechanisms and analysis so they are robust;
- Support, as appropriate, a Masters research student to support data collection and analysis;
- Contribute to the overall overhead and management costs (proportionate to the scale of the project).

Muir Mhòr and the Scottish Seabird Centre will continue to communicate with each other to:

- Determine and agree to the mechanisms of the proposed campaign and the funding from Muir Mhòr;
- Adopt an adaptive management approach to the campaign, to maintain and, where applicable, expand the campaign and its delivery as determined by the levels necessary to deliver required compensation.

We kindly ask you to confirm that this aligns with the Scottish Seabird Centre's understanding and to indicate the Scottish Seabird Centre's agreement to continue collaborating with Muir Mhòr to finalise the outlined matters by signing below.

Signature:

Martha Lovatt

Senior Development & Consents Manager– martha.lovatt@fredolsen.com

Muir Mhòr Offshore Wind Farm

Signature:

Susan Davies

Chief Executive Officer – ceo@seabird.org

Scottish Seabird Centre