Muir Mhòr Offshore Wind Farm

Derogation Case

Appendix C: Predator Control 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.
European Sites	European sites consist of SACs and SPAs, which together provide for the protection and long-term survival of Europe's most valuable and threatened species and habitats. Collectively, these sites comprise the Natura 2000 network of protected sites across Europe.
Inter-array cables	Cables which link the wind turbines generators to each other and the Offshore Electrical Platform(s)(s).
Interconnector cable	Cable which links the Offshore Electrical Platform(s)s 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 cables	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 of Site Integrity
AON	Apparently Occupied Nest
AOS	Apparently Occupied Site
CIMP	Compensation Implementation and Monitoring Plan
EDDR	Early Detection and Rapid Response
EDRR	Early Detection and Rapid Responses
EIA	Environmental Impact Assessment
HVAC	High Voltage Alternating Current
INNS	Invasive Non-Native Species
MCP	Mink Control Project
MHWS	Mean High-Water Springs
MLWS	Mean Low Water Springs
OEP(s)	Offshore Electrical Platform(s)
RIAA	Report to Inform Appropriate Assessment
RSPB	Royal Society for the Protection of Birds
SISI	Scottish Invasive Species Initiative
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
WTG	Wind Turbine Generator

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 Platforms (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 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 Predator Control as a compensation measure for kittiwake, puffin, and guillemot. An overview of species ecology, conservation status, and threats and pressures at SPAs can be found in the Plan (Derogation Case: Appendix A – Ornithological Compensation Plan) and Derogation Case: Appendix E – Compensation Measures: Site Investigation Report.

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 the control of predators to support and increase the annual recruitment of kittiwake, guillemot, and puffin. 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. As part of this, two possible approaches for the predator control measure are set out. The first approach is the implementation of predator control in the form of invasive non-native species (INNS) eradication at one or multiple non-SPA breeding sites, with island colonies in the Firth of Forth prioritised as the main candidate sites for implementation. The other, alternative, approach is collaborative delivery in the form of funding for an existing predator management programme, with the preferred mechanism for this approach being a collaboration with Ossian Offshore Wind Farm to support the Mink Control Project (MCP) in Scotland.

2. EVIDENCE REVIEW: EFFECTIVENESS OF THE MEASURE

2.1. INTRODUCTION

2.1.1. A literature review was undertaken to collate evidence to support the use of predator control to protect kittiwake and auk populations. The literature review consisted of, but was not limited to, scientific journals, government reports, nature blogs, and Statutory Nature Conservation Body (SNCB) websites (such as NatureScot).

2.2. MAMMALIAN PREDATORS

2.2.1. Predation by mammals 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*) 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). On Lundy Island, rat predation was confirmed as the cause of seabird population declines through comparisons with seabird numbers on the rat-free islands of Skomer and Skokholm (Royal Society for the Protection of Birds (RSPB) England, 2021).

2.2.2. 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).

2.2.3. Whilst Kittiwakes 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, Walsh *et al.* (1995) found that kittiwake productivity on the Isles of Scilly declined due to predation by brown rats. 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).

2.2.4. 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). Guillemot typically nest in dense colonies on cliff ledges, among boulder scree, and in various rocky island habitats (Tuck, 1960; Parslow, 1996). However, both Birkhead (1976) and Rowe and Jones (2000) documented predation on guillemot by Arctic foxes (*Vulpes lagopus*, not present in UK). Furthermore, camera traps have captured otters preying on auk eggs (Johnston *et al.*, 2019).

2.2.5. Unlike guillemot, puffin nest in burrows and crevices along the cliffs (Harris and Walness, 2011). Predation from rats and feral cats (amongst other factors) are considered to be a threat to puffin populations across the UK (Harris and Wanes, 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).

2.2.6. 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).

2.3. AVIAN PREDATORS

2.3.1. Species such as great black-backed gulls (*Larus marinus*), hooded crows (*Corvus cornix*), and great skuas (*Stercorarius skua*) prey on seabird eggs and chicks (Johnston *et al.*, 2019; Lopez *et al.*, 2023). The impact of predation on the reproductive success of auks is well-established. For example, Hatchwell (1991) found that predation was the leading cause of breeding failure in a study of approximately 500 guillemot pairs on Skomer Island, and great black-backed gull predation has been estimated to reduce puffin populations by 1.6-8.7% annually (Lopez *et al.*, 2023). Predation of auk eggs and chicks by avian predators is widespread across their colonies (Birkhead, 1977; Hatchwell, 1991; Parrish and Paine, 1996; Ratcliffe, 2004; Zador *et al.*, 2009; Hasebe *et al.*, 2012). Kittiwake, which breed on steep cliffs, may lose their offspring to predation by large gulls and corvids, although larger colonies with high nest density tend to be less vulnerable than smaller colonies (Massaro *et al.*, 2001).

2.3.2. Predation can occur more readily following disturbance from other species that do not directly prey on seabirds. White-tailed eagles, for example, can cause the colony to flush, leaving nests, such as those of kittiwake, unprotected and vulnerable to predation by other avian species, such as herring gulls (*Larus argentatus*) and hooded crows (Hentati-Sundberg *et al.*, 2021; Myran, 2021). Flushing behaviour, which exposes eggs and chicks to predators, is commonly observed among auks and kittiwake (Buckley, 2004).

2.4. EVIDENCE TO SUPPORT PREDATOR CONTROL

2.4.1. A comprehensive literature review conducted by Towns *et al.* (2011) examined the impact of removing introduced mammalian predators from seabird colonies globally. The predators studied included black rats, brown rats, Polynesian rats (*Rattus exulans*), cats, mice, feral pigs (*Sus scrofa*), and Arctic foxes. Multiple positive outcomes were reported from the reviewed predator removal programmes, such as increasing seabird abundance and breeding success, as well as resulting in colony recovery and recolonisation (Towns *et al.*, 2011).

2.4.2. Rats are the most widespread mammalian predator of seabirds. Previously brown rats were considered the most harmful to seabirds, while Polynesian rats also caused a significant level of seabird extinction (Towns *et al.*, 2011). According to Towns *et al.* (2011), amongst mesopredators (predators which occupy a mid-ranking level in the food chain), black (ship) rats are the most harmful predator of seabirds, with an occurrence frequency on islands of at least 15% of predators and responsible for the greatest number of recent local extinctions of seabirds. Amongst apex predators (also known as top predators, found at the top of the food chain), cats have at least 17% occurrence frequency according to Towns *et al.* (2011) but are more restricted in their distribution when compared to rats.

2.4.3. There are two main types of mammalian predator control: eradication-focussed and exclusion-focussed. Eradication measures seek to remove or exterminate predator populations in their entirety from a seabird colony in order to maintain or recover seabird populations, while exclusionary measures prevent predators from accessing seabird colonies. Eradication measures tend to be more effective on islands, unless said islands are easily accessible by predators (e.g., islands that are close to the mainland and can therefore be rapidly recolonised). A global review of invasive vertebrate populations on islands has shown that 88% of eradication events were successful, while 12% failed (Spatz *et al.*, 2022). For mainland colonies and nearshore islands, exclusionary measures are the preferred method of predator control.

2.4.4. Exclusionary measures can be effective for mammalian predators but may be more challenging to implement for avian predators. Eradication measures, while effective, are more expensive to implement and require long-term monitoring and biosecurity measures to ensure predators, which generally procreate at a rapid rate, do not repopulate the area through incursion and subsequent population growth.

2.4.5. There are numerous examples of successful seabird-focused predator eradication programmes. Brooke *et al.* (2018) analysed data from 181 seabird colonies worldwide that had undergone predator eradication programmes. Their findings showed that eradication efforts significantly boosted seabird population growth, with 151 out of 181 colonies experiencing population increases after predator removal (Brooke *et al.*, 2018). Examples of successful predator eradication efforts include the removal of deer mice (*Peromyscus* sp.), resulting in a significant reduction in egg predation on Xantus's murrelets (*Synthliboramphus hypoleucus*)(Millus *et al.*, 2007). A particularly relevant example is the highly successful rat eradication programme carried out on Lundy Island between 2002 and 2006, resulting in a threefold increase in the local seabird population (The Landmark Trust, 2024). The programme saw a significant rise in the guillemot population on the island, from 2,348 to 6,198 individuals between 2000 and 2018; with 9,880 guillemot recorded in 2021 (RSPB England, 2021). The puffin population increased from 13 to 375 individuals between 2000 and 2018, with 848 puffin in 2021 (RSPB England, 2021). This initiative, a collaboration between Natural England, The Landmark Trust, and the RSPB, was followed by biosecurity measures to prevent future re-incursions (The Landmark Trust, 2024). Although the kittiwake population on Lundy has also increased following a prolonged period of decline, this is not believed to be a direct result of the rat eradication, as rats are unlikely to reach the steep ledges where kittiwakes nest on Lundy; rather, their increase is likely linked to favourable foraging and prey availability (Booker *et al.*, 2018), although as noted in paragraph 2.2.3, kittiwake are known to be affected by predation elsewhere.

2.4.6. Predator exclusion methods have also successfully improved breeding seabird populations. For example, exclusion fencing was introduced at the mixed gull colony of South Walney in Cumbria as a predator control measure (Dalrymple, 2023). The colony, comprising approximately 4,000 pairs of large gulls, had seen no fledglings between 2016 and 2020 due to significant predation by red foxes (*Vulpes vulpes*) and badgers (*Meles meles*). Exclusion fencing was installed in March 2021 and surveys were carried out the following two breeding seasons to monitor effectiveness. In 2021, 53 herring gulls fledged from 263 nests, 27 lesser black-backed gulls from 186 nests, and 40 great black-backed gulls from 38 nests, with breeding success rates of 0.20, 0.15, and 1.05, respectively (Dalrymple, 2023). By 2022, the number of nests increased by 151%, with 575 herring gull nests, 553 lesser black-backed gull nests, and 28 great black-backed gull nests, yielding improved breeding success rates of 0.40, 0.61, and 1.21, respectively (Dalrymple, 2023). Exclusion fencing has been shown to be successful at controlling a wide range of predator species. For instance, in Hawai'i twelve predator exclusion fences were built between 2011 and 2023 to protect native seabirds and waterbirds and by 2024, eleven of the fences had completed their management objectives, excluding rats, house mice (*Mus musculus*), rats, mongoose (*Herpestes auropunctatus*), pigs, and axis deer (*Axis axis*) from within the fenced area (Young and VanderWerf, 2024). Where fences proved unsuccessful, control methods including bait stations, traps, and shooting to fully manage predators (Young and VanderWerf, 2024).

PREDATOR CONTROL IN SCOTLAND

2.4.7. 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). The Scottish Wildlife Trust manages the island and is responsible for its predator eradication.

2.4.8. In the Firth of Forth, three non-SPA islands have been identified as hosting populations of mammalian predators: Inchcolm, Inchgarvie, and Inchkeith (Figure 2-1). These islands are regularly visited by tourist boats during the summer which, coupled with their proximity to the mainland, can pose a biosecurity risk, as rodents are strong swimmers, with house mice capable of swimming 0.5 km, black rats 0.75 km, brown rats 2 km, and stoats 3 km (Stanbury *et al.*, 2017). Black rats have been reported on Inchcolm (Ratcliffe *et al.*, 2009; Forth Seabird Group, *pers. comm.*), which supports a small colony of kittiwake (76 Apparently Occupied Nests (AON)), according to 2023 counts conducted by the Forth Seabird Group (Deare, 2023). Brown rats have been reported on Inchgarvie (Forth Seabird Group, *pers. comm.*), but this island does not support any breeding target species (Deare, 2023). Inchkeith has been identified as a priority island for INNS eradication in the UK by Stanbury *et al.* (2017), as it hosts brown rats and house mice. Inchkeith hosts the largest population of nesting seabirds in the non-SPA Forth Islands, with 480 (AON) kittiwake and 170 (individual) guillemot counted in 2023 (Deare, 2023). Puffin also breed on Inchkeith but were not counted by the Forth Seabird Group. Predator management on Inchkeith and Inchcolm thus may have the potential to provide benefits to the target species of this compensation measure.

2.4.9. Scotland currently has one active large-scale predator control programme that has the potential to have a positive effect on seabird populations; the MCP, led by the Scottish Invasive Species Initiative (SISI). Since spring 2018, SISI has worked with volunteers and partners to control American mink (*Neovison vison*) across the northern third of Scotland (SISI, 2024). The programme uses mink monitoring rafts to determine if mink are present, before trapping and humanely dispatching mink. The rafts are equipped with hollow wooden boxes, which mink and other creatures are likely to investigate. A clay pad inside the box will record the imprint of whatever animal passes through it. Putting the traps onto rafts reduces the likelihood of catching non-target species, as few small mammals are aquatic. Once the presence of mink is confirmed, a live capture trap is installed inside the hollow box to catch the mink. Traps are checked daily by volunteers and if non-target species (e.g., pine marten (*Martes martes*) or otters) are captured, they can be safely and securely released. A trained dispatcher is called when a mink is caught to humanely dispatch it.

2.4.10. Between spring 2018 and the end of 2020, 650 rafts and traps have been deployed and looked after by approximately 350 volunteers (SISI, 2024). 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. However, as stated above, eradication programmes on islands tend to be much easier to carry out than on the mainland and as such ongoing mainland eradication efforts will be necessary to maintain benefits to seabird populations. This programme has the potential to cover a larger area of Scotland but requires financial support from partners to do so. The MCP was designed as a five-year project and as such (strategic) compensation for offshore wind farm developments is a potential pathway and opportunity to help prolong the programme's work through securing additional funding.

480000

490000

6210000

6200000

Inchcolm

Inchkeith

Inchgarvie

Legend:

- Island locations in the Firth of Forth

Project:	Report:
Muir Mhòr	Derogation Case Appendix C Predator Control Evidence and Roadmap

Inchcolm, Inchgarvie and Inchkeith,
in the Firth of Forth (Scotland)

Figure: 2-1	Drawing No: GoBe-0201		
Revision:	Date:	Drawn:	Checked:
01	13/11/24	EV	BPHB

Map scale 1:75,000 @ A3

0 1 2 km

Co-ordinate system: ETRS 1989 UTM Zone 30N **EPSG:** 25830

MUIR MHÒR OFFSHORE WIND FARM

A joint venture between Fred. Olsen Seawind & Vattenfall

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3. IMPLEMENTATION

3.1. INTRODUCTION

3.1.1. This Section serves as an outline CIMP, which details how the compensation measure of providing predator control (at selected non-SPA colonies on Scotland's east coast or more widely through collaboration with the NCP) can be implemented and monitored. This Section also details the benefits of predator control at the selected sites and how these measures can address compensation requirements for kittiwake and target auk species (guillemot and puffin).

3.2. POTENTIAL DELIVERY SITES

3.2.1. 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 observations on the presence of avian predators and signs of mammalian predators.

3.2.2. During the site investigations, evidence of predation (predated eggs and a possible puffin carcass) was only found at Findon Ness, located north of Stonehaven (see Figure 3-1 and Figure 3-2 for photographic evidence). However, the site visit did not successfully identify the predator (avian or mammalian) responsible for the event. Two herring gull colonies and a nesting black-backed gull were recorded in the area where the predated eggs and a puffin carcass were discovered, but it cannot be confirmed that either of these species were responsible for the predation. Whilst both species of gulls are known to predate on kittiwake and auk nests (Massaro *et al.*, 2001; Veitch *et al.*, 2016; Nisbet *et al.*, 2020), there is a high likelihood of rodent, badger and foxes also being present at the visited site.

3.2.3. Due to the lack of data surrounding predation at Findon Ness, and the inability to determine whether the predator(s) were non-native or endemic species, targeted exclusionary or eradication methods to control predation are not considered feasible based on the information available at the present time. Furthermore, no direct predation events were witnessed at any of the non-SPA colonies surveyed during the July 2024 surveys. This is not unexpected, as predation can be sporadic in nature and difficult to observe and does not provide evidence that predation is not present. Rather, the threat of predation could not be further established for the non-SPA colonies of interest based on the data collected during the initial site investigations. Further research and more evidence (e.g., using bait traps or cameras) would need to be carried out to determine the threat of predation, and if a predator control measure is appropriate at the non-SPA colonies identified. For those reasons, the nine non-SPA sites are not being considered as a potential site for predator control at this time.

Figure 3-1 Predated guillemot egg at Findon Ness

Figure 3-2 Predated kittiwake eggs at Findon Ness

3.2.1. In addition to the site visits, desk-based investigations into further potential non-SPA sites were undertaken. Stanbury *et al*., (2017) identified 25 islands that should be priorities for invasive species eradication in the UK. Desk-based research was conducted to assess the suitability of a predator control programme on these islands, considering current evidence of predator presence, and any active management already implemented. Inchkeith and Inchcolm islands in the Firth of Forth were identified as potential sites for the implementation of a predator control measure. Whilst the sites were not surveyed as part of the initial site investigations (due to logistical constraints), consultation with the Forth Seabird Group who carry out yearly breeding counts on the Forth islands supported the evidence of INNS in the form of brown and black rats on Inchkeith and Inchcolm, respectively.

3.2.2. The Developer acknowledges that Berwick Bank OWF has previously proposed the implementation of mammalian predator control at Inchcolm, and also considered Inchkeith in their application (although the latter was not taken forward as a final location). However, given the fact that the outcome of the Berwick Bank application is at this stage uncertain, this measure could potentially be progressed at Inchcolm by Muir Mhor, only in the event that Berwick Bank should not require the implementation of compensation at Inchcolm. If, based on the consenting decision, Berwick Bank do progress this measure, the Developer is open to engaging with Berwick Bank to explore a potential collaboration on the subject of predator control at Inchcolm. Alternatively, site selection will be expanded to identify further sites for the delivery of predator control by the Developer.

3.2.3. Inchkeith in particular has strong potential to be a viable location for predator control. As mentioned previously, the presence of brown rats was confirmed on Inchkeith by Stanbury *et al.* (2017) and while their impact on seabirds on the island likely remains low (Forth Seabird Group, *pers. comm.*), it cannot be ignored. Applying the precautionary principle is key to successful predator control, as illustrated by invasion curves which shows that 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. At present, the brown rat population on Inchkeith appears stable (Forth Seabird Group, *pers. comm.*), but rat populations have the potential to increase a rapid rate when conditions are optimal, and if a response to rat population growth is delayed, it may be challenging to establish a successful management programme. Inchkeith is a small island (20 ha) and as such has a high likelihood of successful eradication, and is relatively inexpensive to control (Ratcliffe *et al.*, 2009).

3.3. MINK CONTROL PROJECT SUPPORT

3.3.1. As outlined above (see paragraph 2.4.9), there is a need for the MCP to continue past its end-of-funding date, and there is significant opportunity for its coverage to be extended to other parts of Scotland and thereby increase benefits to seabirds. For seabirds, this expansion would in particular include the western coasts of Scotland (which are currently not under the geographical remit of the MCP). In addition to the site-based delivery of predator control as outlined in the paragraphs above, there is thus also an opportunity to deliver predator control through the support of MCP.

3.4. PROPOSED COMPENSATION MEASURE

3.4.1. As outlined in this document, providing compensation in the form of predator control is feasible, and has the potential to significantly benefit target seabird populations. Mammalian predators can cause extensive damage to seabird colonies, so these control measures could offer crucial protection to the target species for this compensation measure, as well as for entire seabird colonies more widely.

3.4.2. Based on the information outlined above, the Developer proposes to deliver the predator control compensation measure by:

- Delivering and INNS eradication programme at islands where kittiwake, guillemot, and/or puffin are impacted by predation (with Inchkeith and Inchcolm being considered in the first instance, and other islands in wider Firth of Forth region or beyond considered as needed); OR
- Support an existing a predator control programme in Scotland, with a key focus on exploring collaboration with Ossian to work with the SISI to support the MCP and allow it to expand its coverage and provide volunteers with the resources needed to do so.

3.4.3. The proposed measure of predator eradication will require, in collaboration with INNS experts, a further assessment of predators using e.g. bait traps and camera, and identification of the appropriate eradication methods and approach to implement. See further details below. In addition to developing eradication plans, the Developer will further pursue partnership with Ossian to work with the SISI for the MCP as alternative approach to implement the proposed predator control measure.

3.5. MONITORING

3.5.1. If predator control is carried out by the Developer (rather than delivered through the support of an existing programme), the site will be monitored regularly and appropriately to ensure that the predators have not returned to the controlled area. Pre-and post-implementation (i.e. before and after the full removal of the mammalian predator, or before and after installation of control measures) monitoring programmes will be undertaken to detect the presence of mammalian predators.

3.5.2. To monitor the presence of mammalian predators at the chosen implementation sites, field studies will be conducted to identify and observe signs in the form of track, hair, scat and resting places. These surveys can determine the suitable methodologies and locations for further predator monitoring. Guidance from Biosecurity LIFE suggests that pre-eradication monitoring of invasive mammals should include the use of wax chew blocks that can record mammal presence (chew marks), camera traps, and/or tracking in tunnels for footprints (Thomas and Varnham, 2021). Appropriate monitoring schedules and methodologies will be developed in collaboration with INNS experts. Monitoring (e.g. using chew blocks) may also need to take place on ferries and other ships traveling to key seabird colonies, as predators can be inadvertently transported to these islands. Additionally, conservation dogs and their handlers can be deployed near critical seabird sites to aid in predator detection. Regular monitoring ensures early detection, preventing predator populations from growing uncontrollably.

3.5.3. Monitoring efforts will also include tracking of breeding productivity of kittiwake, puffin, and guillemot to assess the population-level effects of the predator control compensation measure. This is typically done through viewpoint studies, with daily checks for nest failures (Beale and Monaghan, 2004). Study plots should be observed both before and after the implementation of predator control measures (Watson *et al.*, 2021).

3.5.4. Should the Developer opt to deliver the predator control compensation measure collaboratively by contributing to the MCP, monitoring will be carried out by mink wardens and programme volunteers under the leadership of the SISI.

MAINTENANCE AND BIOSECURITY MEASURES

3.5.5. Required maintenance will be dependent on the control methods used. For example, baiting stations will need refilling or replacing on a regular basis, and if exclusionary methods in the form of fences or other physical structure are used, these need to be maintained and fixed or replaced as needed to ensure their continued effectiveness.

3.5.6. Biosecurity measures are essential to protect sites from the risk of invasive species reinvading areas that had been previously clear (Thomas and Varnham, 2021). The three key components of biosecurity implementation are quarantine or prevention measures, surveillance procedures and incursion response plans (Thomas *et al*., 2017). Prevention measures reduce the chance of incursion, surveillance is used to search for signs of incursions, and incursion response plans are used to be able to respond quickly to an incursion event (Thomas and Varnham, 2021; Thomas *et al*., 2017). Biosecurity implementation for the duration of the operational lifetime of the Proposed Development will be delivered as part of the implementation of this predator control compensation measure (unless the measure is delivered as support for an existing predator control programme, in which case biosecurity provisions are part of the existing programme).

3.6. FEASIBILITY

3.6.1. As outlined in this document, there is substantial evidence for the feasibility of predator eradication and control, and resulting benefits for seabird populations.

3.6.2. One key issue in predator control occurs when there are multiple predators, and control only targets one species. In the case of cats and rats, for example, controlling cats may influence rat populations (due to cats predating rats), while controlling rats may increase predation by cats of another species. In the case of several predators in the same control area, a full feasibility study is required. At the sites currently considered for predator control this is unlikely to be a concern, as there are no recorded predator interactions between target predators.

3.6.3. It should also be acknowledged that predator control may have negative public perceptions which should be managed with appropriate outreach and engagement, with predator control being considered in light of its effects on ecosystems. Measures also must be taken to ensure non-target species are not negatively impacted by predator control methods (e.g., use of poison bait). A humane approach to predator control is favoured.

3.6.4. Predator control on Inchkeith and Inchcolm will need to be approved by the relevant landowners and site visits will have to be undertaken to carry out a full feasibility study. As outlined previously, should delivery on Inchkeith and Inchcolm be concluded infeasible, other site within the Firth of Forth region or beyond will be considered as alternative options, as will the delivery of this measure through the support of existing programmes such as the MCP.

POTENTIAL BENEFITS

3.6.5. The eradication of predators (such as black and brown rat on Inchcolm and Inchkeith) has significant potential to decrease seabird population mortality rates and increase population sizes through reducing predation on eggs or adults at colonies. As demonstrated in Section 2.4, several measures have successfully eradicated or controlled, predators as well as reducing incursion risk at multiple seabird colonies. The proposed predator control can thus provide compensation, on a like for like basis, due to the important populations of guillemot,

puffin and kittiwake at the identified sites (Ratcliffe *et al*., 2009; Forth Seabird Group, pers. Comm; Deare, 2023).

3.6.6. There should also be acknowledgement of the benefits to the wider ecosystems. On islands, such as Inchkeith, invasive vertebrate eradication has contributed to wider island ecosystem restoration, which could have a positive effect on maintaining or restoring seabird populations (Spatz *et al.*, 2022). In addition, Benkwitt *et al.* (2021) showed that rat eradication can effectively restore the nutrient pathways provided by seabirds across multiple ecosystem boundaries, and these effects have been demonstrated at least several hundred metres from the shoreline.

3.6.7. Furthermore, benefits to breeding populations at Scottish non-SPA colonies are crucial in providing recruits into the wider biogeographical breeding populations, thereby directly supporting the National Site Network and its coherence.

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

3.7. COMPENSATION CHECKLIST

3.7.1. To ensure the Scottish Minister have the information needed to inform their decision on the appropriateness of predator control as a compensation measure, a checklist of the relevant guidance and how it is met by this roadmap is presented in Table 3-1.

Table 3-1-Compensation Measure Checklist.

Checklist Question	Covered in this Report?	Explanation
Is this measure technically feasible?	Yes	This measure has been implemented across many islands including multiple Scottish sites, as well as being currently ongoing in the form of the MCP project. The measure is therefore technically feasible. The Developer will pursue predator control on Inchkeith and Inchcolm, or if needed at alternative sites, undertaken by professional predator control experts using best practice methods and protocols. Alternatively, the Developer will partner with Ossian to work with SISI to support MCP, or another relevant Scottish predator control programme which aims to benefit the target seabird species.
Is this measure financially viable?	Yes	The Developer is committed to securing funding for predator control measure, and considers the measures as set out within this document financially feasible to implement.
Is the measure legally securable?	Yes	The measure has been implemented across Scottish islands, showing the legal feasibility of this measure. Key consents and legal requirements for the implementation of these measures will be progressed by the Developer. The Developer will liaise and work with all landowners and other relevant parties to secure any necessary rights and/or permissions to implement this measure.
Is this measure deliverable?	Yes	This measure has been shown to be deliverable at varying scales with high levels of success (i.e. small and large islands as well as the mainland). This measure can be feasibly delivered and maintained for the lifetime of the Project.

Checklist Question	Covered in this Report?	Explanation
Is this measure ecologically effective (i.e. sufficient)?	Yes	This measure has strong ecological evidence to suggest benefits to breeding kittiwake, and puffin at Scottish colonies. Therefore, the proposed measure is ecologically effective and will maintain the coherence of the network.
With this measure be effective before adverse effects arise?	Yes	Compensation will be implemented (i.e. eradication completed, or control measures implemented) and active (i.e. biosecurity in place) before impacts from the Proposed Development have occurred. Monitoring of the measure will evidence the effectiveness of this measure. Adaptive management options will be pursued if the measure is not (fully) successful.

4. ROADMAP FOR DELIVERY

4.1. SITE SELECTION AND IMPLEMENTATION

4.1.1. As set out in the sections above, priority delivery sites, as well as potential partnership opportunities with existing control programmes have been identified. This process will be progressed through contact with landowners and other relevant parties to finalise partnership agreements and relevant contracts. Alternative sites will be identified should the priority sites not be deemed deliverable during this process.

4.1.2. Predator control will be undertaken by professional predator control experts using well-documented methods and protocols. Biosecurity measures will be put in place from the outset to prevent the arrival of other non-native mammalian predators and will remain in place for the duration of the measure to reduce the risk of re-infestation following eradication. Biosecurity measures may also be carried out via vessel controls on tour boats, bait traps, and wax blocks to detect any early signs of reinvasion. Such methods have for example proven successful at completely eradicating brown rats on the Isle of Canna in the Inner Hebrides (Bell *et al.*, 2011).

4.1.3. Any biosecurity measures employed will aim to be in accordance with the former RSPB Biosecurity for LIFE project, which ran from August 2018 to July 2023 and was set up to raise awareness of the threat of invasive predators to seabirds and put in place measures to prevent their introduction to islands (Biosecurity for LIFE, 2024).

4.1.4. 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 artificial intelligence or remote sensing.

4.1.5. If collaborative delivery of predator control is chosen (instead of eradication or control being carried out by the Developer), predator control will be carried out through the organiser of the relevant predator management programme, such as through the MCP by the SISI (as detailed in paragraph 2.4.7). Funds will be provided as necessary by the Developer to the relevant programme, with funding including the cost of predator control and the provision of wardens or other necessary staff who will carry out monitoring duties and support any volunteers working on the programme.

4.1.6. The Developer aims to implement the measure before the Proposed Development becomes operational. The longevity of the measure will depend on the outcome of predator control, as well as guidance of an extra two years for post-control monitoring to confirm removal, and five years for the biosecurity plans in place to prevent re-incursion (Thomas *et al.*, 2017).

COMPENSATION QUANTUM

4.1.7. The maximum predicted impact of the Proposed Development is 37.24 adult kittiwake, 62.24 guillemot, and 10.2 adult puffin 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 37.24, 62.24, and 10.2 additional breeding adults per annum is thus required, respectively. The key benefit of the delivery of the predator control 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 greatly increase breeding numbers for all target seabird species, as illustrated by the evidence presented, this measure is highly likely to deliver compensation at a ratio of well over 1:1.

4.1.8. It is noted the target seabird species first breed 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.

4.1.9. 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 predator presence and seabird colony size and breeding performance.

4.2. CONSULTATION

4.2.1. 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 predator control can be found in Table 4-1.

Table 4-1 Summary of stakeholder communications regarding predator control

Stakeholder	Communication	Dates	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 mammalian predator eradication at the Firth of Forth Islands. Meeting on 09/10/2024.
Aberdeenshire Council	E-mail	15/08/2024 to 24/09/2024	Landownership and current council seabird conservation/mammalian predator eradication programmes were discussed.
Scottish Seabird Centre	E-mail, Meeting	04/09/2024 to 23/10/2024	Possible compensation measures to support the Scottish Seabird Centre and their projects (including predator control) were discussed. Meeting on 04/09/2024.
National Trust for Scotland	E-mail	19/08/2024 to 24/09/2024	Current seabird conservation initiatives (including predator control) 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 (including predator control) carried out by the Scottish Wildlife Trust for Scotland were discussed.

4.2.2. Post-consent, the Developer will create a steering committee for the duration of the measure to support the Developer in defining the details of site refinement, implementation, monitoring, maintenance, reporting, and other measures necessary for the successful carrying out of the measure. Core members will likely include any SNCBs, as well as site owners and local council(s). These discussions will inform the CIMP and support the implementation of the measure.

4.3. ADAPTIVE MANAGEMENT

4.3.1. 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.

4.3.2. Adaptive management will thus be applied as a part of the package of compensatory measures to ensure resilience and delivery of predator control. 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. When there is clear evidence that the measure is not being delivered, adaptive management will 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.

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

4.3.4. 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).

4.4. KEY CONSENTS AND LEGAL REQUIREMENTS

4.4.1. 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.

4.5. STRATEGIC COMPENSATION

4.5.1. 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 includes 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.

4.5.2. 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.

4.5.3. The Ossian Offshore Wind Farm has partnered with SISI on the MCP as part of its compensation plan. Due to the geographical area needing coverage for optimum mink control in Scotland, there is likely to be scope for the Developer to join efforts in this initiative, thus providing the opportunity to work on the MCP jointly with another offshore wind farm project to deliver the predator control compensation measure strategically.

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