FIVE ESTUARIES OFFSHORE WIND FARM

VOLUME 5, REPORT 5.11: COMPENSATION LONGLIST AND SHORTLIST

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CONTENTS

1 INTRODUCTION

1.1.1 This report combines the previously submitted compensation longlist and shortlist documents which were previously submitted at the Preliminary Environmental Information Report (PEIR) stage and before. Previously submitted Lesser Black-Backed Gull compensation notes have been appended to Volume 5, Report 5.3: Lesser Black-Backed Gull Compensation: Evidence, Site Selection and Roadmap.

1.1.2 This report includes the following documents, which are provided in chronological order:

- Section 2 – Potential Compensation Measures Longlist Report (March 2022);
- Section 3 – Compensation Measures Ranking Approach Note (July 2022);
- Section 4 – Compensation Measures Shortlist Technical Note (July 2022); and
- Section 5 – Shortlisted Ornithological Compensation Options – Next Steps (May 2023).

2 POTENTIAL COMPENSATION MEASURES LONGLIST REPORT (MARCH 2022)

FIVE ESTUARIES
OFFSHORE WIND FARM

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POTENTIAL COMPENSATION MEASURES LONGLIST REPORT

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CONTENTS

DEFINITION OF ACRONYMS

TERM	DEFINITION
AEoI	Adverse Effects on Integrity
AOE SPA	Alde-Ore Estuary Special Protection Area
DCO	Development Consent Order
EU	European Union
FFC SPA	Flamborough and Filey Coast Special Protection Area
GT	Gannet
HRA	Habitats Regulations Assessment
IROPI	Imperative Reasons of Overriding Public Interest
KW	Kittiwake
LBBG	Lesser Black-backed Gull
M&LS SAC	Margate and Long Sands Special Area of Conservation
NE	Natural England
PINS	Planning Inspectorate
RAG	Red-Amber-Green assessment
SNCBs	Statutory Nature Conservation Bodies
SAC	Special Area of Conservation
SCI	Site of Community Importance
VE	Five Estuaries Offshore Wind Farm
VE OWFL	Five Estuaries Offshore Windfarm Ltd
WID	Water Injection Dredging

1. BACKGROUND

1.1 FIVE ESTUARIES OWF

1.1.1 Five Estuaries Offshore Wind Farm (VE) is a proposed extension to the operational Galloper Offshore Wind Farm, which is located approximately 37 km off the coast of Suffolk, England (at its closest point).

1.1.2 As part of the DCO application, Five Estuaries Offshore Windfarm Ltd (VE OWFL) is required to present the information needed to undertake a Habitats Regulations Assessment (HRA). If the HRA process deems that Adverse Effects on Integrity (AEoI) cannot be excluded, a derogations process is followed. In the event that no alternative solutions can be found, and if there are imperative reasons of overriding public interest (IROPI), the final stage of the derogations process is to develop measures to compensate for harm to a site.

1.2 DEROGATION PREPARATION

1.2.1 In order to allow for sufficient time to engage with stakeholders and develop compensation plans, VE OWFL is investigating compensation options at this early stage in the pre-application period and does not prejudice the outcome of the ongoing HRA process. VE OWFL is identifying potential compensation measures for VE and creating a 'longlist' of all possible options. The longlisted options are based on the existing VE project proposal, experience with HRA derogation matters in the UK and stakeholder feedback received to date (See Appendix 1).

1.2.2 The longlist will be subject to refinement following a ranking criteria assessment (otherwise known as a Red-Amber-Green (RAG) assessment). The RAG assessment methodology is currently being developed and will take into account the latest advice and guidance on derogation matters, available supporting evidence, timescale of implementation and experience from other projects in the UK who have put forward a derogation case in support of an offshore wind DCO application etc. Ongoing work to address evidence gaps will be taken into account, as will any outputs of the wider HRA and associated consultation with statutory nature conservation bodies (SNCBs) and wider stakeholders.

1.2.3 Three documents will be used to inform the design of the ranking criteria against which the longlist of compensation options will be scored and narrowed down into a short list. These are the European Commission publication *"Managing Natura 2000 sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC"* (European Commission, 2018); Defra guidance, currently under consultation, titled *"Best practice guidance for developing compensatory measures in relation to Marine Protected Areas"* (Defra, 2021); and the Natural England *"Checklist for compensatory measure submissions"* (Natural England, 2021).

1.2.4 This Potential Derogation Measures Longlist Report to Natural England summarises and accompanies VE OWFL's longlist of possible compensation measures under consideration for three high risk sites as agreed by NE through consultation (see meeting minutes from NE monthly project call, 8 November 2021) : Alde-Ore Estuary Special Protection Area (AOE SPA), Flamborough and Filey Coast Special Protection Area (FFC SPA), and Margate and Long Sands Special Area of Conservation (M&LS SAC).

2. SUMMARY OF OPTION TYPES

2.1 POTENTIAL SANDBANK COMPENSATION MEASURES

2.1.1 There are 19 potential benthic compensation options in the longlist of potential measures. These fall within four main themes:

- Habitat improvement;
- Threat reduction;
- Habitat re-creation; and
- Reserve re-creation.

HABITAT IMPROVEMENT

2.1.2 Two potential options have been identified under habitat improvement:

- **Fisheries management**: Spatial reduction of bottom trawling across sandbanks.
- **Enhancement/restoration** of the undesignated *Sabellaria spinulosa (S. spinulosa)* as a wider feature of the SAC.

2.1.3 Although the M&LS SAC does not have Annex I reef as a feature, there is evidence that *S. spinulosa* is present in the site (albeit in patchy areas forming crusts rather than reefs) and indicates the health of the sandbank system[1]. Therefore, enhancement/restoration of this species establishment could be considered as an aspirational compensation measure which may be considered a Measure of Equivalent Environmental Benefit (MEEB) as noted in the draft Defra guidance (Defra, 2021).

2.1.4 Enhancement/restoration efforts could be informed by understanding recruitment and colonisation rates of *S. spinulosa* and protecting the sensitive areas of M&LS SAC at sensitive stages of its life cycle, allowing the area to have time to rejuvenate. It may also be useful to understand and reduce predation pressure on *S. spinulosa.*

2.1.5 Bottom trawling restrictions within M&LS SAC will remove the threat of habitat disturbance, damage and loss but is unlikely to be favourable to the fishing industry given that there is already an active byelaw restricting bottom towed gear within specific areas of M&LS SAC[2]. A review of all available extant data on the extent, distribution and species/community structure of the sandbanks will enable an assessment of the locations of sensitive areas (i.e. locations of *S. spinulosa*). Data could be used, if appropriate to do so, to determine any known change in distribution and / or recoverability so that a judgement can be made on the potential for recolonisation rates of *S. spinulosa* to inform or update existing management or more sustainable fishing practices within the site. An assessment of existing fishing activity could be completed to understand if further changes or measures could be implemented to facilitate development of *S. spinulosa* reef. This work could inform consideration of extending the current byelaw area. Further engagement with NE, Marine Management Organisation and the Kent and Essex IFCA should be undertaken to explore the practicalities of extending or enhancing this area.

[1] JNCC site details: http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0030371
[2] https://www.gov.uk/government/publications/the-margate-and-long-sands-european-marine-site-specified-areas-bottom-towed-fishing-gear-byelaw

HABITAT RECREATION

2.1.6 Three potential habitat re-creation options have been identified:

- **Sediment budget increase:** establishing new sandbank areas (e.g. via coastal sandscaping and natural sediment reworking);
- **Sediment budget maintenance**: a commitment to depositing all dredged material from seabed preparation or other sediment relocation works (i.e., sandwave clearance) within the Special Area of Conservation (SAC), providing its characteristics are closely matched to that of the site; and
- **Sediment budget maintenance:** a commitment to limiting sandwave clearance within the SAC to agitation dredging (i.e., water injection dredging (WID)).

2.1.7 Coastal sandscaping projects could be used to increase the local sediment budget by depositing sandy sediment in intertidal areas close to M&LS SAC and relying on the sediment to be reworked and become part of the sandbank system. Initial identification and review of coastal frontages along the coastlines around the Outer Thames region including Kent, Essex and Suffolk, that are experiencing beach sediment loss is required to understand likely mechanisms in order to maximise the benefits.

2.1.8 Making efforts to maintain sediment or depositing new material within the sandbank system may also encourage new sandbank formation. However, consideration of existing channels that are used for navigation will need to be considered. Any risks to channels (dredged or undredged) could result in significant navigational safety risk and may therefore impact the feasibility of this measure. For that reason it is considered unlikely that this be progressed given the importance of the shipping routes within the region.

RESERVE CREATION

2.1.9 Two potential reserve creation options have been identified:

- **Extending an Annex I designated SAC** boundary to include areas formed as biogenic reef and adding biogenic reef (or other MEEB feature) as a feature to the site; and
- **Extending an Annex I designated SAC** boundary to include additional sandbanks outside of current boundary.

2.1.10 Both of these options could be achieved strategically through the development of the case to extend the site with other organisations and industries. However, a thorough understanding of the SAC/Site of Community Importance (SCI) designation process is required (including a consideration of its timeline against the likely need for this compensation to be delivered prior to any activity which may result in AEoI) as well as the quality, sufficiency, and adequacy of the data requirements on the extent, distribution and species/community structure of the proposed areas for inclusion.

2.1.11 Given that the UK is no longer part of the European Union (EU) and M&LS SAC was originally designated as a European marine site, the process of designating sites as ‘national site network sites’ is currently not clear and requires thorough investigation and discussion with NE and DEFRA. a desk-based review may be required to understand the financial cost of this measure to other marine users.

2.1.12 VE OWFL could facilitate a SAC extension by supporting the designation process which would be undertaken by the relevant Statutory Nature Conservation Body (SNCB). This could be achieved through funding posts within the relevant SNCB to undertake all relevant assessment and consultation work. VE OWFL would need to seek to engage with the SNCBs to understand how this could be achieved.

THREAT REDUCTION

2.1.13 Eleven potential threat reduction options have been identified, under the following four general themes:

- **Funding mechanisms** for: research on microplastics and contaminant loading across Greater Thames region; engagement with general public to raise awareness of and reduce marine litter and plastic waste and improve disposal and recycling; buying out or ending other harmful activities across sandbank structure;
- **Debris removal:** removal of anthropogenic waste; facilitating the rapid recovery/retrieval of lost fishing equipment across the sandbanks; and removal of disused infrastructure across sandbanks;
- **Control of marine invasive non-native species:** implementation of controls or active removal to minimise the spread and impact of INNS on a designated site; and
- **Management of physical and chemical processes:** improving hydrodynamics across sandbanks; cross-industry engagement and management of aggregate dredging pressure (spatial or temporal); engagement with ports and shipping industry on use of WID as preferred dredging method; and improving water quality across sandbanks via strategic agreements with local water companies, local planning authorities and land owners.

2.1.14 Financial contributions to expand ongoing projects (such as the Thames Estuary Partnership's Dredging Liaison Group[3] marine microplastics research and other citizen led marine litter clean-up initiatives) provides a potential opportunity for compensation on sandbanks by enabling a better understanding of the risks and sandbank sensitivity to large-scale impacts that are not manageable or mitigatable at a site-specific scale. Determination of how the research outputs could be used to inform measures for site improvement would need to be established as well as how to use the findings to inform policy, best practice, or management measures/byelaws. The delivery timescale would also need to be established to ensure the compensation would be deliverable in the required timescales. Marine debris and fishing gear removal measures have been proposed and accepted as a compensation measure for sandbanks as a result of the impact of the Norfolk Boreas OWF and Norfolk Vanguard construction. Measures including the removal of debris will require implementation plans and an understanding of the potential for marine debris removal measures to damage benthic habitats, inform whether planned marine debris removal on site would support restoration of protected habitats, and inform the methods for removal.

[3] https://www.thamesestuarypartnership.org/forums

2.1.15 Marine non-native species have been recorded within the site, including razorshell *Ensis americanus*, the amphipod *Corophium sextonae*, and slipper limpet *Crepidula fornicata* (Natural England, 2022). Removing these species is likely to relieve competition and predation pressures on indigenous/key sandbank community species. The UKTAG (2008) paper reports that of the three invasive species recorded within the site, the presence of slipper limpet presents the highest risk to water bodies, with the amphipod species the lowest risk and razorshell risk unknown; therefore, to achieve the highest benefit the slipper limpet could be targeted. Recommended control measures for slipper limpet are dredging/manual collection as demonstrated by the French ARVAL programme (Fitzgerald, 2007; Syvret and Fitzgerald, 2008) or smothering with sediment as demonstrated in the Menai Strait in 2007 (Stockan and Fielding, 2017). Information to assess the effectiveness of the removal of marine non-native species is required on the cost benefit ratio and longevity of the measure (i.e., even with lots of time and money resource being invested, is this likely to have only limited, short-term gains?). Data on priority areas to target and the spatial limit for eradication is required. Consideration will also need to be given as to the potential effects of any removal activities - this will be considered as part of the next stage of the work to identify feasibility and overall benefits of the measure.

2.1.16 Improving hydrodynamics across the site will facilitate sediment disturbance, replenishment, and larval dispersal, however, the online conservation advice package notes that there is some uncertainty over how the physical energy objective could be developed (Natural England, 2022).

2.1.17 Management of aggregate dredging pressure is unlikely to be favourable to the aggregate industry, and similar to proposals for fishing activity management it may be prudent carry out a desk-based study to assess recoverability rates of sandbanks and its community structure (bearing in mind that the sandbank feature is known to be exposed to high energy and natural disturbance, whereby habitats are quickly recolonised (Tillin et al., 2020)) which may allow aggregate restriction areas to be alternately closed across the site.

2.1.18 Liaison and engagement with the local ports and shipping industry to implement best navigational and maintenance dredging practices (i.e., Water Injection Dredging) within the local area, has the potential to minimise impact on sedimentary regime by ensuring that sediment is maintained within the system and is available for sandbank sustainment. However, this will depend on the suitability of sediment for agitation dredging and whether it is an efficient method financially for the port operators. An understanding of how to implement any agreed best practice is also required, so that it is in place prior to AEoI on the sandbank feature occurring. Similarly, liaison, engagement and education of the water industry regulators and landowners within the catchment of M&LS SAC would need to take place, to ascertain buy in and to establish which water quality parameters are adversely affecting the feature along with their likely sources.

2.2 POTENTIAL ORNITHOLOGY COMPENSATION MEASURES

2.2.1 The sections below describe all longlisted compensation measures in respect of high risk species identified, namely Kittiwake (KW and Lesser Black-backed Gull (LBBG), grouped by the ecological mechanism for delivery. Consideration is also given to Gannet (GT) for which a number of these proposed compensation measures are also appropriate.

INCREASING BREEDING NUMBERS

2.2.2 The following compensation measures for increasing breeding numbers were longlisted:

- **Onshore nesting structure**: Constructing a nesting structure at an onshore location with the aim to provide additional breeding spaces. Target species and site: KW (FFC SPA), GT (FFC SPA), LBBG (AOE SPA);
- **Offshore nesting structure – new**: Constructing a nesting structure at an offshore location with the aim to provide additional breeding spaces. Target species and site: KW (FFC SPA), GT (FFC SPA), LBBG (AOE SPA);
- **Offshore nesting structure – repurposed**: Repurposing an old structure, such as a decommissioned rig or platform, into an offshore nesting structure with the aim to provide additional breeding spaces. Target species and site: KW (FFC SPA), GT (FFC SPA), LBBG (AOE SPA);
- **Enhancing colony establishment**: Playbacks and models can be used at potential nesting sites to facilitate the establishment of a new colony near an area of high food availability. This is generally playbacks of bird sounds (or typical noises from a colony) through a speaker and models of the target species on the rocks/ledges (Jones and Kress, 2012). . Target species and site: GT (FFC SPA); and
- **Herring Gull control**: Control Herring Gull numbers to reduce competition for nest sites and predation. Target species and site: LBBG (AOE SPA).

REDUCING BREEDING FAILURE

2.2.3 The following compensation measures for reducing breeding failure were longlisted:

- **Predator exclusion fencing**: Erect predator-proof fencing around a breeding colony, with the aim of reducing nest predation and thereby increasing breeding success. Target species and site: LBBG (AOE SPA);
- **Predator management**: lethal or non-lethal predator control measures at a breeding colony to reduce nest predation and increase breeding success. Target species and site: KW (FFC SPA), LBBG (AOE);
- **Peregrine Falcon diversionary feeding**: Provide alternative food for Peregrine Falcons to reduce Kittiwake mortality from predation. Target species and site: KW (FFC SPA);
- **Peregrine Falcon alternative prey enhancement**: Indirect diversionary feeding by increasing wood pigeon productivity to provide additional wood pigeons as food source for Peregrine Falcon. Target species and site: KW (FFC SPA);
- **Great Skua exclusion**: Exclude Great Skua from Kittiwake colony to reduce breeding failure due to Skua predation. Target species and site: KW (FFC SPA); and
- **Storm defense construction**: Construct storm defenses around colonies vulnerable to storm damage to reduce breeding failure caused by extreme weather events. Target species and site: KW (FFC SPA).

REDUCING BYCATCH MORTALITY

2.2.4 The following compensation measure for reducing bycatch mortality was longlisted:

- **Bycatch reduction equipment:** Use deterrent equipment attached to fishing gear to reduce ornithological bycatch, with the aim of increasing adult survival. Target species and site: KW (FFC SPA), GT (FFC SPA), LBBG (AOE SPA)

INCREASING FOOD AVAILABILITY

2.2.5 The following compensation measures for increasing food availability were longlisted:

- **Fishery quota purchase**: Purchase fisheries quota for key prey species such as sandeel and/or sprat, thereby increasing food availability. Target species and site: KW (FFC SPA), GT (FFC SPA), LBBG (AOE SPA);
- **Fisheries closure**: Close sandeel/sprat fisheries near SPA, creating fishery exclusion zone, with the aim of boosting local food availability for seabirds. Target species and site: KW (FFC SPA), GT (FFC SPA), LBBG (AOE SPA);
- **Reduce fisheries quota**: Improve food availability through reducing fishing pressure by working with stakeholders to reduce sandeel/sprat quota in regions near the SPA. Target species and site: KW (FFC SPA), GT (FFC SPA), LBBG (AOE SPA);
- **Fund sandeel alternatives research**: Sandeel are fished extensively for pig- and salmon-feed. This measure funds research and trials into alternatives to the use of sandeel, to thereby reduce fishing pressures and increase food availability for seabirds. Target species and site: KW (FFC SPA), GT (FFC SPA);
- **Prey habitat enhancement**: Improve or provide additional seagrass habitat (e.g. seagrass used as spawning/nursery grounds) to increase fish populations. Target species and site: KW (FFC SPA), GT (FFC SPA);
- **Directed offal discards**: Fund initiative to encourage fisheries to discard offal close to colonies and away from fishing activities. Target species and site: KW (FFC SPA), GT (FFC SPA); and
- **Supplementary feeding**: Provide supplementary food near the nest during the breeding season. Target species and site: KW (FFC SPA), GT (FFC SPA), LBBG (AOE SPA)

REDUCING DISTURBANCE

2.2.6 The following compensation measures for reducing breeding disturbance were longlisted:

- **Funding engagement with the watersports industry**: Funding engagement with the watersports industry to raise awareness on seabird disturbance from watersport activities. Target species and site: KW (FFC SPA), GT (FFC SPA);
- **Warden funding**: Fund the employment of (additional) wardens to guide visitor behaviour and raise awareness on disturbance. Target species and site: KW (FFC SPA), GT (FFC SPA), LBBG (AOE SPA);
- **Engagement with air space users**: Funding engagement with air space users with aim of achieving voluntarily avoidance of airspace above SPA during breeding season. Target species and site: LBBG (AOE SPA);
- **Signage installation**: Install visitor signage with information on ways to reduce disturbance. Target species and site: KW (FFC SPA), GT (FFC SPA), LBBG (AOE SPA); and
- **Alternative trail development**: At visitor sites, fund the design of alternative trails to avoid sensitive/key breeding areas. Target species and site: KW (FFC SPA), GT (FFC SPA), LBBG (AOE SPA).

REDUCING ANTHROPOGENIC MORTALITY

2.2.7 The following compensation measures for reducing breeding anthropogenic mortality were longlisted:

- **End Gannet chick harvest**: Work with stakeholders to end licensed Sula Sgeir Gannet chick harvest. Target species and site: GT (FFC SPA);
- **End Lesser Black-backed Gull culling**: End licensed culling of Lesser Black-backed Gull. Target species and site: LBBG (AOE SPA);
- **Plastic waste removal**: Remove plastic waste at key non-SPA colonies to reduce mortality from entanglement. Target species and site: KW (FFC SPA), GT (FFC SPA);
- **Aquaculture entanglement reduction**: Fund initiatives into solutions to reduce Gannet entanglement in aquaculture netting. Target species and site: GT (FFC SPA); and
- **Marine litter engagement funding**: Fund engagement with general public to raise awareness of marine litter, threats to seabirds and ways to reduce plastic waste and improve disposal. Target species and site: KW (FFC SPA), GT (FFC SPA).

REDUCING OIL SPILL MORTALITY

2.2.8 The following compensation measure for reducing oil spill mortality was longlisted:

- **Oil spill management improvements**: Facilitate improvements in oil spill prevention and management (e.g. research, advice and/outreach with shipping industry). Target species and site: KW (FFC SPA), GT (FFC SPA).

INCREASING PRODUCTIVITY

2.2.9 The following compensation measures for increasing productivity were longlisted:

- **Marine SPA creation**: Designate new marine SPA in key offshore foraging location. Target species and site: KW (FFC SPA), GT (FFC SPA), LBBG (AOE SPA); and
- **Nest material provisioning**: Provide nesting material to support breeding at offshore structures. This is a supporting measure to improve breeding at offshore sites. Target species and site: KW (FFC SPA), GT (FFC SPA)

NON-LIKE FOR LIKE OPTIONS

2.2.10 A range of non-like for like options, which do not directly target the impacted species but rather deliver wider ornithological conservation gains, were also considered in the longlist. Such non-like for like options are included as part of the hierarchy of compensatory measures as outlined by Defra in *"Best practice guidance for developing compensatory measures in relation to Marine Protected Areas"* (2021). The longlisted non-like for like options for VE is:

- Protection of Common Tern colonies from flooding;
- Construction and deployment of predator-proof nesting rafts for Common Tern;
- Storm defences to protect Petrel and Guillemot nesting sites;
- Use of artificial nesting burrows to provide breeding space for Puffins and Shearwaters;
- Measures to reduce Fulmar, Guillemot and/or Razorbill bycatch in longline fisheries; and
- Predator eradication at Shearwater and Petrel breeding sites.

3. NEXT STEPS

3.1.1 The longlist of options will be RAG assessed to rank the various compensation measures and refine them down to a shortlist of preferred options. Once all options have been ranked and a shortlist has been identified, the shortlisted options will be investigated in more detail to identify the most feasible, practicable and proportionate compensation options for VE OWFL.

3.1.2 In addition, evidence gaps associated with the compensation options are being outlined, and potential research work to fill evidence gaps identified. This information will be used to further inform the feasibility and potential efficacy of all measures.

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APPENDIX 1 FIVE ESTUARIES COMPENSATION MEASURES

BENTHIC COMPENSATION MEASURES

COMPENSATION TYPE	MEASURE	FEATURE	SITE	DESCRIPTION
Habitat improvement	Fisheries management	Sandbanks	M&LS SAC	Spatial reduction of bottom trawling across sandbanks / extending current byelaw area (see 'The Margate and Long Sands European Marine Site (Specified Areas) Bottom Towed Fishing Gear Byelaw 2017' available at https://www.gov.uk/government/publications/the-margate-and-long-sands-european-marine-site-specified-areas-bottom-towed-fishing-gear-byelaw)
Habitat improvement	Enhancement of *S. spinulosa* reef.	Annex I Reef	M&LS SAC	Enhancement/restoration of the undesignated *S. spinulosa* as a wider feature of the SAC.
Habitat re-creation	Establish new sandbank areas	Sandbanks	M&LS SAC	Coastal sandscaping to increase extent of habitats (maintaining or increasing the local sediment budget for new formation of sandbanks following natural reworking)
Reserve creation	Extend SAC and add feature	Annex I Reef	M&LS SAC	Extend the SAC boundary to include areas where Annex I *Sabellaria spinulosa* reef is found (rather than just encrustations) and add as feature to SAC. This could be achieved strategically through development of case to extend the site.
Reserve creation	Extend SAC	Sandbanks	M&LS SAC	Extend the SAC boundary to include additional sandbanks outside of current boundary. This could be achieved strategically through development of case to extend the site.
Threat reduction	Debris removal	Sandbanks	M&LS SAC	Removal of anthropogenic waste, not related to fishing gear across sandbanks.
Threat reduction	Debris awareness	Sandbanks	M&LS SAC	Fund engagement with general public to raise awareness of marine litter, and ways to reduce plastic waste and fishing equipment loss and improve disposal and recycling.
Threat reduction	Lost gear retrieval	Sandbanks	M&LS SAC	Facilitate rapid recovery of lost fishing equipment across the sandbanks.

COMPENSATION TYPE	MEASURE	FEATURE	SITE	DESCRIPTION
Threat reduction	Fisheries management	Sandbanks	M&LS SAC	Introduction of mechanism that would enable fisheries management to be re-considered.
Threat reduction	Marine activity restrictions	Sandbanks	M&LS SAC	Financial contribution to the cost of ending, or buying-out, other harmful activities across the sandbanks.
Threat reduction	Debris removal	Sandbanks	M&LS SAC	Removal of disused infrastructure across sandbanks
Threat reduction	Removing marine non-native species	Sandbanks & Annex I Reef	M&LS SAC	Invasive species eradication
Threat reduction	Hydrodynamics	Sandbanks & Annex I Reef	M&LS SAC	Improving hydrodynamics across sandbanks (removing threat of adverse impacts on sedimentary regime for sediment disturbance and replenishment, as well as encouraging larval dispersal)
Threat reduction	Water Quality	Sandbanks & Annex I Reef	M&LS SAC	Improving water quality across sandbanks (improving habitat for fauna of this habitat). Could be a strategic effort with local water companies, LPAs and landowners?
Threat reduction	Aggregate dredging activity management	Sandbanks & Annex I Reef	M&LS SAC	Further reduction/management of aggregate dredging pressure (spatial or temporal). Requires cross-industry engagement and agreement. Financial incentives?
Threat reduction	Management of navigational maintenance dredging methods	Sandbanks	M&LS SAC	Work with the ports and shipping industry to implement best navigational and maintenance dredging practices (i.e. Water Injection Dredging) within the local area, to minimise impact on sedimentary regime by ensuring that sediment is maintained within the system and is available for sandbank sustainment.
Habitat re-creation	Sediment budget	Sandbanks	M&LS SAC	Committing to depositing all material dredged or relocated for sand wave clearance within the SAC boundary to maintain local sediment budget within and around the SAC
Habitat re-creation	Sediment budget	Sandbanks	M&LS SAC	Committing to limiting sand wave clearance method to agitation dredging such as water injection dredging in order to maintain sediment budget within and around the SAC

ORNITHOLOGY COMPENSATION MEASURES

COMPENSATION TYPE	ECOLOGICAL MECHANISM	MEASURE	SPECIES	SITE	DESCRIPTION
Species recovery	Increasing breeding numbers	Onshore artificial nest site	Kittiwake	FFC SPA	Building an onshore Kittiwake nesting structure
Species recovery	Increasing breeding numbers	Onshore nesting structure	Gannet	FFC SPA	Building an onshore Gannet nesting structure
Species recovery	Increasing breeding numbers	Onshore nesting structure	Lesser Black-backed Gull	AOE SPA	Building an onshore Lesser Black-backed Gull nesting structure
Species recovery	Increasing breeding numbers	Offshore new nesting structure	Kittiwake	FFC SPA	Building a new offshore Kittiwake nesting structure
Species recovery	Increasing breeding numbers	Offshore new nesting structure	Gannet	FFC SPA	Building a new offshore Gannet nesting structure
Species recovery	Increasing breeding numbers	Offshore new nesting structure	Lesser Black-backed Gull	AOE SPA	Building a new offshore Lesser Black-backed Gull nesting structure
Species recovery	Increasing breeding numbers	Offshore repurposed nesting structure	Kittiwake	FFC SPA	Repurposing an old structure (e.g. decommissioned rig) into an offshore Kittiwake nesting structure
Species recovery	Increasing breeding numbers	Offshore repurposed nesting structure	Gannet	FFC SPA	Repurposing an old structure (e.g. decommissioned rig) into an offshore Gannet nesting structure
Species recovery	Increasing breeding numbers	Offshore repurposed nesting structure	Lesser Black-backed Gull	AOE SPA	Repurposing an old structure (e.g. decommissioned rig) into an offshore Lesser Black-backed Gull nesting structure
Species recovery	Reducing predation pressure	Predator exclusion fencing	Lesser Black-backed Gull	AOE SPA	Erect predator-proof fencing around a breeding colony to reduce predation
Species recovery	Reducing predation pressure	Predator management	Lesser Black-backed Gull	AOE SPA	Lethal/non-lethal predator control at breeding colony to reduce predation

COMPENSATION TYPE	ECOLOGICAL MECHANISM	MEASURE	SPECIES	SITE	DESCRIPTION
Threat reduction	Reducing bycatch mortality	Bycatch reduction deterrent equipment	Gannet	FFC SPA	Use deterrent equipment attached to fishing gear to reduce ornithological bycatch
Threat reduction	Reducing bycatch mortality	Bycatch reduction deterrent equipment	Kittiwake	FFC SPA	Use deterrent equipment attached to fishing gear to reduce ornithological bycatch
Threat reduction	Reducing bycatch mortality	Bycatch reduction deterrent equipment	Lesser Black-backed Gull	AOE SPA	Use deterrent equipment attached to fishing gear to reduce ornithological bycatch
Rights acquisition	Increasing food availability	Fishery quota purchase	Kittiwake	FFC SPA	Purchase fishery quota for sandeel and/or sprat
Rights acquisition	Increasing food availability	Fishery quota purchase	Gannet	FFC SPA	Purchase fishery quota for sandeel and/or sprat
Rights acquisition	Increasing food availability	Fishery quota purchase	Lesser Black-backed Gull	AOE SPA	Purchase fishery quota for sandeel and/or sprat
Species recovery	Increasing food availability	Fisheries closure	Kittiwake	FFC SPA	Close sandeel/sprat fisheries near SPA (fishery exclusion zone)
Species recovery	Increasing food availability	Fisheries closure	Gannet	FFC SPA	Close sandeel/sprat fisheries near SPA (fishery exclusion zone)
Species recovery	Increasing food availability	Fisheries closure	Lesser Black-backed Gull	AOE SPA	Close sandeel/sprat fisheries near SPA
Species recovery	Increasing food availability	Reduce fisheries quota	Kittiwake	FFC SPA	Work with stakeholders to reduce sandeel/sprat quota in regions near the SPA
Species recovery	Increasing food availability	Reduce fisheries quota	Gannet	FFC SPA	Work with stakeholders to reduce sandeel/sprat quota in regions near the SPA
Species recovery	Increasing food availability	Reduce fisheries quota	Lesser Black-backed Gull	AOE SPA	Work with stakeholders to reduce sandeel/sprat quota in regions near the SPA

COMPENSATION TYPE	ECOLOGICAL MECHANISM	MEASURE	SPECIES	SITE	DESCRIPTION
Species recovery	Increasing food availability	Funding sandeel alternatives research	Kittiwake	FFC SPA	Fund research and trials into sandeel alternatives for pig and salmon feed
Species recovery	Increasing food availability	Funding sandeel alternatives research	Gannet	FFC SPA	Fund research and trials into sandeel alternatives for pig and salmon feed
Threat reduction	Reducing disturbance	Engagement funding - watersports	Kittiwake	FFC SPA	Funding engagement with watersports industry to raise awareness on seabird disturbance from watersport activities
Threat reduction	Reducing disturbance	Engagement funding - watersports	Gannet	FFC SPA	Funding engagement with watersports industry to raise awareness on seabird disturbance from watersport activities
Threat reduction	Reducing disturbance	Warden funding	Kittiwake	FFC SPA	Fund additional wardens to monitor visitors and raise awareness on disturbance
Threat reduction	Reducing disturbance	Warden funding	Gannet	FFC SPA	Fund additional wardens to monitor visitors and raise awareness on disturbance
Threat reduction	Reducing disturbance	Warden funding	Lesser Black-backed Gull	AOE SPA	Fund additional wardens to monitor visitors and raise awareness on disturbance
Threat reduction	Reducing disturbance	Direct engagement funding - air space	Lesser Black-backed Gull	AOE SPA	Funding engagement with air space users with aim of achieving voluntarily avoidance of airspace above SPA during breeding season
Threat reduction	Reducing disturbance	Signage installation	Kittiwake	FFC SPA	Install visitor signage with information on ways to reduce disturbance
Threat reduction	Reducing disturbance	Signage installation	Gannet	FFC SPA	Install visitor signage with information on ways to reduce disturbance
Threat reduction	Reducing disturbance	Signage installation	Lesser Black-backed Gull	AOE SPA	Install visitor signage with information on ways to reduce disturbance

COMPENSATION TYPE	ECOLOGICAL MECHANISM	MEASURE	SPECIES	SITE	DESCRIPTION
Threat reduction	Reducing disturbance	Alternative trail development	Kittiwake	FFC SPA	Fund design of alternative trails to avoid sensitive/key areas
Threat reduction	Reducing disturbance	Alternative trail development	Gannet	FFC SPA	Fund design of alternative trails to avoid sensitive/key areas
Threat reduction	Reducing disturbance	Alternative trail development	Lesser Black-backed Gull	AOE SPA	Fund design of alternative trails to avoid sensitive/key areas
Species recovery	Reducing predation pressure	Crow control	Kittiwake	FFC SPA	Control crow population near SPA to reduce predation
Species recovery	Reducing breeding failure	Mammalian predator control	Kittiwake	FFC SPA	Control of mammalian predators at island colony to reduce predation
Species recovery	Reducing breeding failure	Peregrine Falcon diversionary feeding	Kittiwake	FFC SPA	Provide alternative food for Peregrine Falcons to reduce Kittiwake mortality from predation
Species recovery	Reducing breeding failure	Peregrine Falcon alternative prey enhancement	Kittiwake	FFC SPA	Indirect diversionary feeding: increase wood pigeon productivity to provide additional wood pigeons as food source for Peregine falcon
Species recovery	Reducing anthropogenic mortality	End chick harvest	Gannet	FFC SPA	End licensed Sula Sgeir Gannet chick harvest
Species recovery	Reducing entanglement mortality	Plastic waste removal	Gannet	FFC SPA	Remove plastic waste at key non-SPA colonies to reduce mortality from entanglement
Species recovery	Reducing entanglement mortality	Plastic waste removal	Kittiwake	FFC SPA	Remove plastic waste at key non-SPA colonies to reduce mortality from entanglement

COMPENSATION TYPE	ECOLOGICAL MECHANISM	MEASURE	SPECIES	SITE	DESCRIPTION
Species recovery	Reducing anthropogenic mortality	End culling	Lesser Black-backed Gull	AOE SPA	End licensed culling of Lesser Black-backed Gull
Species recovery	Increasing food availability	Prey habitat enhancement	Kittiwake	FFC SPA	Improve or provide additional seagrass habitat (e.g. seagrass used as spawning/nursery grounds) to increase fish populations
Species recovery	Increasing food availability	Prey habitat enhancement	Gannet	FFC SPA	Improve or provide additional seagrass habitat (e.g. seagrass used as spawning/nursery grounds) to increase fish populations
Species recovery	Increasing food availability	Directed offal discards	Kittiwake	FFC SPA	Fund initiative to encourage fisheries to discard offal close to colonies and away from fishing activities
Species recovery	Increasing food availability	Directed offal discards	Gannet	FFC SPA	Fund initiative to encourage fisheries to discard offal close to colonies and away from fishing activities
Habitat re-creation	Increasing productivity	Marine SPA creation	Kittiwake	FFC SPA	Designate new marine SPA in key offshore foraging location
Habitat re-creation	Increasing productivity	Marine SPA creation	Gannet	FFC SPA	Designate new marine SPA in key offshore foraging location
Habitat re-creation	Increasing productivity	Marine SPA creation	Lesser Black-backed Gull	AOE SPA	Designate new marine SPA in key offshore foraging location
Species recovery	Increasing productivity	Nest material provision	Kittiwake	FFC SPA	Provide nesting material to support breeding at offshore structures
Species recovery	Increasing productivity	Nest material provision	Gannet	FFC SPA	Provide nesting material to support breeding at offshore structures
Threat reduction	Reduce breeding failure	Storm defence construction	Kittiwake	FFC SPA	Construct storm defences around colonies vulnerable to storm damage to reduce breeding failure

COMPENSATION TYPE	ECOLOGICAL MECHANISM	MEASURE	SPECIES	SITE	DESCRIPTION
Species recovery	Reducing predation pressure	Great Skua exclusion	Kittiwake	FFC SPA	Exclude Great Skua from Kittiwake colony
Species recovery	Reducing anthropogenic mortality	Aquaculture entanglement reduction	Gannet	FFC SPA	Reduce Gannet entanglement in aquaculture netting
Species recovery	Increasing breeding numbers	Enhancing colony establishment	Gannet	FFC SPA	Use playbacks and models to facilitate the establishment of a new colony near an area of high food availability
Species recovery	Improving food availability	Supplementary feeding	Kittiwake	FFC SPA	Provide supplementary food near the nest during the breeding season
Species recovery	Improving food availability	Supplementary feeding	Gannet	FFC SPA	Provide supplementary food near the nest during the breeding season
Species recovery	Improving food availability	Supplementary feeding	Lesser Black-backed Gull	AOE SPA	Provide supplementary food near the nest during the breeding season
Threat reduction	Reducing oil spill mortality	Oil spill management improvements	Kittiwake	FFC SPA	Facilitate improvements in oil spill prevention and management (e.g. research, advice, outreach)
Threat reduction	Reducing oil spill mortality	Oil spill management improvements	Gannet	FFC SPA	Facilitate improvements in oil spill prevention and management (e.g. research, advice, outreach)
Threat reduction	Reducing oil spill mortality	Oil spill management improvements	Lesser Black-backed Gull	AOE SPA	Facilitate improvements in oil spill prevention and management (e.g. research, advice, outreach)
Threat reduction	Reducing anthropogenic mortality	Engagement funding - plastics	Kittiwake	FFC SPA	Fund engagement with general public to raise awareness of marine litter, threats to seabirds and ways to reduce plastic waste and improve disposal

COMPENSATION TYPE	ECOLOGICAL MECHANISM	MEASURE	SPECIES	SITE	DESCRIPTION
Threat reduction	Reducing anthropogenic mortality	Engagement funding - plastics	Gannet	FFC SPA	Fund engagement with general public to raise awareness of marine litter, threats to seabirds and ways to reduce plastic waste and improve disposal
Species recovery	Increasing breeding numbers	Herring Gull control	Lesser Black-backed Gull	AOE SPA	control Herring Gull numbers to reduce competition for nest sites and predation
Threat reduction	Reducing breeding failure	Protection of colonies from flooding	Common tern	NA	This is a non-like-for-like compensation option targeting a different species than the one impacted. Construct flood protection around a Common Tern colony susceptible to flooding.
Species recovery	Reducing breeding failure	Provision of predator-proof nesting rafts (Dr. Craik)	Common tern	NA	This is a non-like-for-like compensation option targeting a different species than the one impacted. Construct and deploy predator-proof nesting raft to provide additional breeding spaces with reduced predation risk.
Threat reduction	Reducing breeding failure	Storm defences (Orkney & Shetland)	Petrel & guillemot	NA	This is a non-like-for-like compensation option targeting a different species than the one impacted. Construct storm defences at susceptible breeding sites to reduce breeding failure from extreme weather events.
Species recovery	Increasing breeding numbers	Artificial nesting burrows	Puffins & shearwaters	NA	This is a non-like-for-like compensation option targeting a different species than the one impacted. Provide artificial nesting burrows to increase available breeding sites.
Threat reduction	Reducing anthropogenic mortality	Longline bycatch mitigation	Fulmar	NA	This is a non-like-for-like compensation option targeting a different species than the one impacted. Implement mitigation measures to reduce Fulmar bycatch

COMPENSATION TYPE	ECOLOGICAL MECHANISM	MEASURE	SPECIES	SITE	DESCRIPTION
Species recovery	Reducing breeding failure	Predator eradication	Shearwater & petrel	NA	This is a non-like-for-like compensation option targeting a different species than the one impacted.
Threat reduction	Reducing anthropogenic mortality	Bycatch mitigation	Guillemot & razorbill	NA	This is a non-like-for-like compensation option targeting a different species than the one impacted. Implement mitigation measures to reduce Guillemot and Razorbill bycatch
Habitat improvement	Increasing habitat availability	Creation/protection of saltmarshes or wetland habitat	*avian community*	NA	This is a non-like-for-like compensation option targeting a different species than the one impacted. Create, enhance and/or protect saltmarsh or wetland habitats to increase habitat availability for the wider avian community.

3 COMPENSATION MEASURES RANKING APPROACH NOTE (JULY 2022)

FIVE ESTUARIES
OFFSHORE WIND FARM

FIVE ESTUARIES OFFSHORE WIND FARM

COMPENSATION MEASURES RANKING APPROACH NOTE

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1.1	20/06/22	Revised draft	GoBe	RM	HT
2.0	06/07/22	Final for issue	GoBe	RM	HT

CONTENTS

DEFINITION OF ACRONYMS

TERM	DEFINITION
AEoI	Adverse Effects on Integrity
DCO	Development Consent Order
Defra	Department for Environment, Food & Rural Affairs
HRA	Habitats Regulations Assessment
IROPI	Imperative reasons of overriding public interest
NSIP	Nationally Significant Infrastructure Project
NSN	National Site Network
PINS	Planning Inspectorate
RAG	Red, Amber, Green
VE	Five Estuaries Offshore Wind Farm
VE OWFL	Five Estuaries Offshore Wind Farm Limited

1. BACKGROUND

1.1.1 Five Estuaries Offshore Wind Farm (VE) is a proposed extension to the operational Galloper Offshore Wind Farm, which is located approximately 30 km off the coast of Suffolk, England.

1.1.2 VE is a Nationally Significant Infrastructure Project (NSIP) under Section 15(3) of the Planning Act 2008 (as amended) (PA 2008). As such there is a requirement to apply for a Development Consent Order (DCO) to the Planning Inspectorate (PINS).

1.1.3 As part of the DCO application, VE OWFL is required to present the information needed to undertake a Habitats Regulations Assessment (HRA). In order to maintain the coherence of the National Site Network (NSN) network, the HRA process assesses whether the proposal has significant effects on the site features, conservation objectives and site integrity. If the HRA process deems that Adverse Effects on Integrity (AEoI) cannot be excluded, a derogations process is followed. The derogations process assesses whether alternative solutions can be found. In the event that no alternative solutions can be found, and if there are imperative reasons of overriding public interest (IROPI), the final stage of the derogations process is to develop measures to compensate for harm to a site.

1.1.4 This document has been produced to facilitate the development of compensation measures that will form part of an HRA derogation case as required for VE. It provides information to help inform decisions regarding the potential feasibility of compensation measures. The document outlines the ranking methodology used to narrow down an initial longlist of compensation ideas into a shortlist of options. Categories against which compensation options were evaluated are outlined, and the scoring system and criteria discussed.

2. RANKING APPROACH

2.1 CURRENT GUIDANCE

2.1.1 Three documents were used to inform the design of the ranking criteria against which the longlist of compensation options will be scored and narrowed down into a short list. These are the European Commission publication *"Managing Natura 2000 sites. The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC"* (European Commission, 2018); Defra guidance, currently under consultation, titled *"Best practice guidance for developing compensatory measures in relation to Marine Protected Areas"* (Defra, 2021); and the Natural England *"Checklist for compensatory measure submissions"* (Natural England, 2021).

2.1.2 The European Commission (2018) outlines the following criteria for designing compensatory measures:

- **Targeted compensation** – the compensatory measures must be specific and appropriate to the predicted impacts;
- **Effective compensation** – to ensure compensation measures are effective, *"technical feasibility must go hand in hand with the appropriate extent, timing and location of the compensatory measures"*. Monitoring during the implementation period is needed to ensure long-term effectiveness;
- **Technical feasibility** - the compensatory measure must follow the best scientific knowledge, and take into account the specific requirements of the ecological features;
- **Extent of compensation** – the extent required *"is directly related to the quantitative and qualitative aspects inherent to the elements of integrity likely to be impaired and to the estimated effectiveness of the measures"*;
- **Location of compensatory** measures – compensatory measures should be located as to be most effective at maintaining Natura 2000 network coherence;
- **Timing of compensation** – compensation must be in place at a time that ensures continuity in ecological processes; and
- **Long term implementation** – the legal and financial basis for long-term implementation, protection, monitoring and maintenance must be secured.

2.1.3 The draft Defra guidance (2021) propose that all projects should consider the following factors:

"a) The extent of the impact – the number and status of the features affected;

b) The environmental value and function of the affected feature;

c) The environmental value and function of the proposed compensatory measure;

d) The location of the proposed compensatory measure;

e) How quickly compensatory measures are expected to be functioning and contributing to the network; and

f) The confidence in the measure being entirely effective and the ability for its success to be monitored and managed accordingly."

2.1.4 In addition, Defra outline a hierarchy of compensatory measures based on the principle that the use of non-like for like measures decreases the certainty of success. Compensatory measures lower on the compensation hierarchy are expected to deliver a larger extent of compensation. The compensation hierarchy is described as follows:

- Address same impact at same location;
- Same ecological function, different location;
- Comparable ecological function, same location;
- Comparable ecological function, different location;

2.1.5 Natural England, in its check list for compensatory measures submissions (Natural England, 2021), provides the following list of aspects that need to be included in detail in application submissions:

"a) What, where, when: clear and detailed statements regarding the location and design of the proposal.

b) Why and how: ecological evidence to demonstrate compensation for the impacted site feature is deliverable in the proposed locations

c) For measures on land, demonstrate that on ground construction deliverability is secured and not just the requirement to deliver in the DCO e.g. landowner agreement is in place. For measures at sea, demonstrate that measures have been secured e.g. agreements with other sea or seabed users.

d) Policy/legislative mechanism for delivering the compensation (where needed)

e) Agreed DCO/DML conditions

f) Clear aims and objectives of the compensation

g) Mechanism for further commitments if the original compensation objectives are not met – i.e. adaptive management

h) Clear governance proposals for the post-consent phase – we do not consider simply proposing a steering group is sufficient

i) Ensure development of compensatory measures is open and transparent as a matter of public interest, including how information on the compensation would be publicly available

j) Timescales for implementation especially where compensation is part of a strategic project, including how timescales relate to the ecological impacts from the development

k) Commitments to ongoing monitoring of measure performance against specified success criteria

l) Proposals for ongoing 'sign off' procedure for implementing compensation measures throughout the lifetime of the project, including implementing feedback loops from monitoring.

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

2.2 RANKING CRITERIA

2.2.1 Using the recommendations from the European Commission, Defra and Natural England discussed in the previous section, the following seven ranking categories were designed:

- Specificity;
- Effectiveness;
- Technical feasibility;
- Extent;
- Timing;
- Environmental value; and
- Long-term planning.

2.2.2 For each ranking category, a scoring system ranging from one to five was designed, with one representing the lowest score and five the highest. The highest-scoring compensation measures will be taken forward to the compensation measure shortlist. In the section below, each category and the corresponding scoring criteria are discussed in detail.

SCORING

2.2.3 **Specificity**: Does the compensation measure target the impacted feature at the impacted location, or is the focus of the proposed measure a different feature and/or different location?

- 5 points: the proposed measure benefits the impacted feature at the impacted SPA/SAC.
- 4 points: the proposed measure benefits the same feature, but at a different site in the National Site Network.
- 3 points: the proposed measure benefits the same feature, but at a different, non-SPA/SAC site.
- 2 points: the proposed measure benefits a different feature at the impacted SPA/SAC.
- 1 point: the proposed measures benefit a different feature at a different site (either within the national site network or elsewhere).

2.2.4 Effectiveness: is there confidence that the measure will be effective at delivering the required compensation at the proposed location?

- 5 points: There is strong evidence on the effectiveness of the proposed measure for the impacted feature, and the effectiveness has been evidenced at similar locations (e.g. within similar habitat types).
- 4 points: There is some evidence on the effectiveness of the proposed measure for this feature. Additionally, there is substantial evidence of the effectiveness of the proposed measure for a broadly similar feature/location, or substantial evidence of the effectiveness of a similar measure for the same feature/location.
- 3 points: There is some evidence on the effectiveness of the proposed measure for this feature. Additionally, there is some evidence of the effectiveness of the proposed measure for a broadly similar feature/location, or some evidence of the effectiveness of a similar measure for the same feature/location.
- 2 points: There is little to no evidence on the effectiveness of the proposed measure at the impacted feature and proposed location. There is some evidence

of the effectiveness of the proposed measure for a broadly similar feature/location, or some evidence of the effectiveness of a similar measure for the same feature/location.

- 1 point: There is little to no evidence that the proposed measure will be effective. There is also no evidence on the effectiveness of the proposed, or similar measures on other features.

2.2.5 **Technical feasibility**: Does the technology/policy/legislative framework for delivery exist? Is the measure designed according to the best scientific knowledge, and is it targeted to the requirements of the impacted feature? Could the deliverability of the measure be secured (e.g. landowner agreement/planning permission in place).

- 5 points: The technology, policy and/or legislative framework exists and is of high scientific quality and targeted to the impacted feature. Any landowner agreements, planning permissions etc. can be in place by DCO submission.
- 4 points: The technology, policy and/or legislative framework exists and is of high scientific quality, but some work is needed (e.g. small changes to technical designs or minor, feasible, policy changes). Discussions for landowner agreements, planning permissions etc. will be underway, with some security in place by DCO submission (such as letters of comfort etc.).
- 3 points: The technology, policy and/or legislative framework exists, but substantial work is needed (re-designs of technology, substantial legislation changes, obtaining landowner agreement, getting planning permission).
- 2 points: Technical deliverability is deemed challenging. The technology, policy and/or legislative framework does not yet exist (but could potentially be developed), or substantial challenges in obtaining the relevant permissions are anticipated.
- 1 point: Technical delivery is unlikely to be achievable. The technology, policy and/or legislative framework does not yet exist and is unlikely to be developed within the required timeframe. Alternatively, technology/policy/legislation exists, but other aspects of technical delivery (e.g. obtaining landowner agreement/planning permission) are deemed infeasible.

2.2.6 **Extent:** Can the measure be feasibly delivered at the extent (e.g. at the necessary size/area/duration) needed to deliver the required compensation? Note that this category does not consider technical feasibility and anticipated timeframes for delivery, which are assessed in separate categories.

- 5 points: The compensation measure is delivered at such a large extent that once in place, full compensation is delivered within a very short timeframe, and substantial additional gains are likely delivered over the lifetime of the measure. Ecological function will be re-instated so rapidly that ratios of 1:1 (or below) could be considered.
- 4 points: The compensation measure is delivered at a large extent, and is anticipated to deliver more than the required amount of compensation.
- 3 points: The measure will be delivered at the extent required for full compensation, but substantial additional gains are not anticipated.
- 2 points: There is uncertainty around delivering this measure at the required extent for full compensation. Ratios above 1:1 and contingency plans will be needed to ensure the compensation is delivered.
- 1 point: The measure cannot feasibly be realised at the required extent to deliver compensation.

2.2.7 **Timing:** Are the timescales for implementation appropriate? Are they proportionate to the anticipated ecological impacts, and do they ensure continuity of network connectivity and ecological processes?

- 5 points: The measure will be fully operational and is delivering the required compensation before the ecological impacts occur.
- 4 points: The measure will be operational by the time the ecological impacts occur, but there is some uncertainty around the required compensation being fully delivered at that point in time (e.g. due to technical constraints). Any time lag is not anticipated to compromise the national site network connectivity or lead to population losses. Overcompensation may be delivered to compensate for any interim losses.
- 3 points: The measure will be operational by the time the ecological impacts occur, but the required compensation cannot feasibly be fully delivered at that time (e.g. due to time needed for ecological processes to mature). Any time lag is not anticipated to compromise national site network connectivity or lead to population losses. Overcompensation may be delivered to compensate for the interim losses.
- 2 points: There is uncertainty about the measure being operational by the time the ecological impacts occur, but there is certainty about the compensation being delivered within the operational phase of the wind farm. Overcompensation may be delivered to compensate for the interim losses.
- 1 point: There is substantial uncertainty about the measure being operational by the time the ecological impacts occur, and there is uncertainty about the feasibility of delivering the compensation during the lifetime of the wind farm.

2.2.8 **Environmental value:** How great is the environmental value and function of the proposed compensation measure?

- 5 points: The compensation measure benefits not only the impacted species or feature. It also likely benefits multiple other species, features or ecological processes. Non-target species which benefit include one or more species/feature of conservation concern (e.g. a red-listed species, or a locally struggling species/habitat).
- 4 points: The compensation measure benefits not only the impacted species or feature, it also likely benefits multiple other species, features or ecological processes of conservation concern (e.g. a red-listed species, or a locally struggling species/habitat).
- 3 points: The compensation measure benefits not only the impacted species or feature, but also likely benefits another species, feature or ecological process. of conservation concern (e.g. a red-listed species, or a locally struggling species/habitat).
- 2 points: The measure is anticipated to deliver the necessary compensation for the impacted feature at a ratio or spatial scale significantly larger than required (i.e. overcompensates), but no wider environmental benefits are delivered.
- 1 point: The measure is anticipated to deliver the necessary compensation for the impacted feature, at the ratio required, but no wider environmental benefits are delivered.

2.2.9 **Long-term planning:** Is the legal and financial basis for the project secured? Are long-term monitoring plans in place? Is management and maintenance assured?

- 5 points: The legal & financial basis[1] for the project can or will be secured before DCO submission. Long-term management and maintenance of compensation measure (including full plans, funding, legal rights etc.) can or will be fully planned and secured before DCO submission. Comprehensive long-term monitoring and adaptive management mechanisms can or will be fully secured (including full plans, funding, legal rights etc.) before DCO submission.
- 4 points: The legal & financial basis OR the long-term management & maintenance OR the long-term monitoring & adaptive management can or will NOT be secured by DCO submission, but all are anticipated to be in place before construction commences.
- 3 points: Multiple aspects of the long-term planning (i.e. legal & financial basis, long-term management & maintenance, long-term monitoring) can or will NOT be secured by DCO submission, but all are anticipated to be in place before construction commences.
- 2 points: There is uncertainty about fully securing all long-term planning before construction commences. One or more aspects of the long-term planning can or will likely NOT be secured before the construction phase, but all are anticipated to be in place before the operational phase.
- 1 point: There is considerable uncertainty around the delivery of the long-term planning, and/or not all aspects of long-term planning can be feasibly delivered.

2.3 RAG GROUPING

2.3.1 Longlisted compensation measures are scored according to the criteria outlined above. Scores for each category are then summed to provide a total score (out of a maximum of 35 points)

2.3.2 Each compensatory measure was then allocated to a Red, Amber or Green group based on their total score as follows:

RED: 7 – 15 points
AMBER: 16 – 25 points
GREEN: 26 – 35 points

2.3.3 Measures from the **GREEN** group are taken forward to the shortlist of compensation options.

[1] The legal and financial requirements will differ between compensation options. Examples include, but are not limited to, planning permission, access permission, land acquisition, permits and funding agreements.

3. REFERENCES

Defra (2021, for consultation), 'Best practice guidance for developing compensatory measures in relation to Marine Protected Areas'. Defra guidance consultation document.

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4 COMPENSATION MEASURES SHORTLIST TECHNICAL NOTE (JULY 2022)

FIVE ESTUARIES
OFFSHORE WIND FARM

FIVE ESTUARIES OFFSHORE WIND FARM

COMPENSATION MEASURES SHORTLIST TECHNICAL NOTE

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CONTENTS

TABLES

Definition of acronyms

TERM	DEFINITION
AEoI	Adverse Effects on Integrity
AOE	Alde-Ore Estuary
DCO	Development Consent Order
FFC	Flamborough & Filey Coast
FOCI	Feature of Conservation Importance
HRA	Habitats Regulations Assessment
IROPI	Imperative reasons of overriding public interest
LSE	Likely Significant Effect
MCZ	Marine Conservation Zone
M&LS SAC	Margate & Long Sands Special Area of Conservation
MMF	Mean-max foraging range
NE	Natural England
RAG	Red, Amber, Green
SAC	Special Area of Conservation
SD	Standard Deviation
SPA	Special Protection Area
VE	Five Estuaries Offshore Wind Farm
VE OWFL	Five Estuaries Offshore Wind Farm Limited

1. INTRODUCTION

1.1 BACKGROUND

FIVE ESTUARIES OFFSHORE WIND FARM

1.1.1 Five Estuaries Offshore Wind Farm (VE) is a proposed extension to the operational Galloper Offshore Wind Farm. VE would be located approximately 37 km off the coast of Suffolk, England (at its closest point).

1.1.2 As part of the Development Consent Order (DCO) application, Five Estuaries Offshore Windfarm Ltd (VE OWFL) is required to undertake a Habitats Regulation Assessment (HRA) and report the information needed to undertake an Appropriate Assessment. If the HRA process deems that Adverse Effects on Integrity (AEoI) cannot be excluded, a derogations process is followed. In the event that no alternative solutions can be found, and if there are imperative reasons of overriding public interest (IROPI), the final stage of the derogations process is to develop measures to compensate for adverse effects on a site.

DEROGATION PREPARATION

1.1.3 In order to allow for sufficient time to engage with stakeholders and develop compensation plans, VE OWFL is investigating compensation options at this early stage in the pre-application period, but this does not prejudice the outcome of the ongoing HRA process.

1.1.4 The three sites identified for being at the highest risk of requiring derogation for VE are the following : Alde-Ore Estuary (AOE) Special Protection Area (SPA), Flamborough and Filey Coast (FFC) SPA, and Margate and Long Sands (M&LS) Special Area of Conservation (SAC).

1.1.5 VE OWFL has identified potential compensation measures for VE and created a 'longlist' of all possible compensation options at the three high risk sites. The longlisted options are based on the existing VE project proposal, experience with HRA derogation matters in the UK and stakeholder feedback received to date. These longlisted options are discussed in 'Five Estuaries Offshore Wind Farm: Potential compensation measures longlist report' (VE OWFL, 2022$_a$).

1.1.6 The longlist options were narrowed down to a shortlist following a ranking criteria assessment (otherwise known as a Red-Amber-Green (RAG) assessment) (VE OWFL, 2022$_b$). The shortlisted options are presented within this report.

1.1.7 Additional work will be undertaken on the shortlisted options to further define feasibility, siting, timelines and evidence gaps.

1.2 AIMS AND OBJECTIVES

1.2.1 This technical note outlines the findings from the ranking of the longlist and discusses the shortlisted options identified as potential measures to compensate for:

- Potential impacts on Northern gannet (*Morus bassanus*, hereafter referred to as 'gannet') and black-legged kittiwake (*Rissa tridactyla*, hereafter referred to as 'kittiwake') at FFC SPA
- Potential impacts on lesser black-backed gull (*Larus fuscus*) at AOE SPA
- Potential physical disturbance/loss of sandbanks slightly covered by sea water all the time (hereafter referred to as 'sandbanks') at M&LS SAC resulting from installation of cable protection

1.3 FFC SPA

1.3.1 FFC SPA is 251 km from VE. The SPA is designated for gannet kittiwake, common guillemot (*Uria aalge*, hereafter referred to as 'guillemot'), razorbill (*Alca torda*) and the seabird assemblage.

1.3.2 VE screening (VE OWFL, 2021) concluded potential for Likely Significant Effect (LSE) for kittiwake and gannet, and as such they should be assessed within the RIAA. For kittiwake, the potential for LSE arises from potential collision risk with turbines. For gannet, the potential for LSE arises from potential collision risk, and displacement.

1.3.3 It should be noted that screening concluded no LSE for guillemot and razorbill (VE OWFL, 2021), however Natural England (NE) have previously raised concerns on the potential of future North Sea wind farm project impacts on guillemot and razorbill at FFC SPA. NE has highlighted that their advice for the Examination for Hornsea 4 (ongoing at the time of writing) could be that AEoI cannot be ruled out for guillemot and/or razorbill displacement, which could lead to future requirements for other North Sea projects to consider in-principle compensation for guillemot and razorbill at FFC SPA. As such, whilst there are currently no derogation concerns identified for VE beyond gannet and kittiwake, VE OWFL will follow developments regarding guillemot and razorbill during the Hornsea 4 examination.

1.4 AOE SPA

1.4.1 AOE is 15 km away from VE. The SPA is designated for marsh harrier (*Circus aeruginosus*), lesser black-backed gull, ruff (*Philomachus pugnax*), avocet (*Recurvirostra avosetta*), little tern (Sterna albifrons), Sandwich tern (*Sterna sandvicensis*) and redshank (*Tringa tetanus*).

1.4.2 VE is within MMF + 1SD from VE for lesser black-backed gull, and there is therefore potential connectivity between the SPA and VE. Concern regarding collision risk has been raised for lesser black-backed gull on other projects by NE, and recent decisions on other offshore wind projects (e.g. Boreas, Vanguard, East Anglia ONE North and East Anglia TWO) concluded that AEoI could not be ruled out for lesser black-backed gull at AOE SPA when considered in-combination with other projects. As a precedent for concern around AEoI has been established on other projects, the species is thus of derogation potential for VE.

1.5 M&LS SAC

1.5.1 The M&LS SAC is designated for sandbanks and the VE Offshore Export Cable Route (OECR) passes directly through the site. In the Extension Round Strategic HRA (The Crown Estate, 2019), the document highlighted that the feature condition is considered to be favourable. Further, it was concluded that there was no AEoI at this site.

1.5.2 Nevertheless, recent precedent has been set on Hornsea Three and Vattenfall's Norfolk Boreas and Norfolk Vanguard projects that where cable protection installation within a SAC cannot be avoided, then an AEoI conclusion may be reached by the Secretary of State. Although these projects are compensating for a feature that is deemed to be in an *unfavourable* condition, this feature at M&LS SAC remains a derogation potential for VE.

2. SHORTLISTED COMPENSATION PROPOSALS

2.1 OVERVIEW

2.1.1 Due to the similarity of several of the longlist options (see VE OWFL, 2022$_a$), we have hereafter grouped similar options for clarity; for ornithological features, the longlist options of fisheries closure, fisheries quota reduction, and fisheries quota purchase are grouped under “fisheries management”. The longlist options of onshore artificial nesting sites, new offshore artificial nesting sites, and repurposed offshore artificial nesting sites are grouped under “artificial nest sites”. The options of alternative trail development, signage installation and warden funding are grouped under “disturbance reduction”.

2.1.2 The following sections present a summary of the conclusions of the shortlisting approach. Full details of the shortlisting scores and rationale are presented in the accompanying Scoring Matrix.

2.2 KITTIWAKE AT FFC SPA

2.2.1 Table 2.1 shows the RAG assessment results for the longlist options for kittiwake.

2.2.2 None of the 20 options were ranked as red (low-scoring), 15 options as amber (intermediate), and five as green (top-scoring and taken forward to the shortlist).

Table 2.1 – RAG scores for kittiwake compensation options.

COMPENSATION OPTION	RAG SCORE
Exclusion of great skua (*Stercorarius skua*) from breeding colonies	AMBER
Oil spill management improvements	AMBER
Construction of storm defences near colony	AMBER
Kittiwake bycatch reduction	AMBER
Provisioning of nest materials	AMBER
Sandeel alternatives research funding	AMBER
Mammalian predator management	AMBER
Plastic waste removal from colonies	AMBER
Peregrine falcon (*Falco peregrinus*) alternative prey enhancement	AMBER
Watersports engagement (reducing watersports disturbance)	AMBER
Supplementary feeding	AMBER
Engagement funding on plastics and marine litter	AMBER
Marine SPA creation	AMBER
Peregrine falcon diversionary feeding	AMBER
Artificial nest sites	GREEN
Fisheries management	GREEN
Directed offal discards	GREEN
Prey habitat enhancement	GREEN
Crow control	GREEN
Disturbance reduction	GREEN

2.2.3 The RAG score was determined by a variety of criteria; the main reasons for each amber-listed option not being deemed feasible are discussed in APPENDIX A.

2.3 GANNET AT FFC SPA

2.3.1 Table 2.2 shows the RAG assessment results for the longlist options for gannet. None of the 17 options were ranked as red (low-scoring), 12 options as amber (intermediate), and five as green (top-scoring and taken forward to the shortlist).

Table 2.2 – RAG scores for gannet compensation options.

COMPENSATION OPTION	RAG SCORE
Oil spill management improvements	AMBER
Provisioning of nest materials	AMBER
Sandeel alternatives research funding	AMBER
Supplementary feeding	AMBER
Disturbance reduction	AMBER
Fisheries management	AMBER
Aquaculture entanglement reduction	AMBER
Enhancing colony establishment	AMBER
Ending gannet chick harvest	AMBER
Watersports engagement (reducing watersports disturbance)	AMBER
Engagement funding on plastics and marine litter	AMBER
Marine SPA creation	AMBER
Artificial nest sites	GREEN
Directed offal discards	GREEN
Gannet bycatch reduction	GREEN
Plastic waste removal from colonies	GREEN
Prey habitat enhancement	GREEN

2.3.2 The main reasons for each amber-ranking option for gannet not being deemed a suitable compensation option are discussed in APPENDIX A.

2.4 LESSER BLACK-BACKED GULL AT AOE SPA

2.4.1 Table 2.3 shows the RAG assessment results for the longlist options for lesser black-backed gull (for full details on the shortlisting methodology and longlist. None of the 13 options were ranked as red (low-scoring), eight options as amber (intermediate), and five as green (top-scoring and taken forward to the shortlist).

Table 2.3 – RAG scores for lesser black-backed gull compensation options.

COMPENSATION OPTION	RAG SCORE
Herring gull control	AMBER
Oil spill management improvements	AMBER
Artificial nest sites	AMBER
End lesser black-backed gull culling	AMBER
Fisheries management	AMBER
Air space user engagement (reducing air disturbance)	AMBER
Lesser black-backed gull bycatch reduction	AMBER
Marine SPA creation	AMBER
Supplementary feeding	GREEN
Predator exclusion fencing	GREEN
Predator management	GREEN
Disturbance reduction	GREEN
Habitat creation	GREEN

2.4.2 The RAG score was determined by a variety of criteria; the main reason for each amber-listed option not being deemed feasible is discussed briefly in in APPENDIX A.

2.5 NON-LIKE FOR LIKE ORNITHOLOGY COMPENSATION

2.5.1 In addition to the gannet, kittiwake and lesser black-backed gull compensation options, a range of non-like for like ornithology compensation options were considered as part of the longlist and shortlisting. The results for these options are presented in Table 2.4.

Table 2.4 – RAG scores for non-like for like compensation options.

COMPENSATION OPTION	TARGET SPECIES	RAG SCORE
Construction of storm defences near colony	Petrel spp. and guillemot	AMBER
Colony flood protection	Common tern (*Sterna hirundo*)	AMBER
Artificial nesting burrows	Puffin (*Fratercula arctica*) and Manx shearwater (*Puffinus puffinus*)	AMBER
Predator-proof nesting rafts	Common tern	AMBER
Predator eradication	Manx shearwater, petrel spp.and Auk spp.	AMBER
Creation and/or protection of saltmarshes	Avian community	GREEN
Longline bycatch reduction	Northern fulmar (*Fulmarus glacialis*)	GREEN
Bycatch reduction	Guillemot & razorbill	GREEN

2.5.2 Non-like for like options are not discussed further in this technical note, but could be revisited in the future if additional compensation options need to be explored, for example in the event that none of the like for like options are deemed feasible.

2.6 SANDBANKS AT M&LS SAC

2.6.1 The longlist options for sandbanks were grouped into four compensation themes: habitat improvement, habitat re-creation, reserve creation and threat reduction (see VE OWFL, 2022a).

2.6.2 Table 2.5 shows the RAG assessment results for the longlist options for M&LS SAC. All four options aimed at compensating for impacts on the Annex I reef feature were ranked as either red (low-scoring) or amber (intermediate-scoring). This is because Annex I reef is not listed as a feature despite evidence of it forming in parts of the site it. In addition, it is considered that these measures would not specifically offset the impacts on sandbank habitat or help to maintain the overall ecological coherence of the network of sites). Therefore, none of the reef options are taken forward to the shortlist or discussed further in this technical note. Nevertheless, these could be revisited in the future if additional compensation options need to be explored, for example in the event that none of the like for like options taken forward to the shortlist at this time are deemed implementable at a later stage.

2.6.3 The remaining 17 compensation options were aimed at compensating for sandbanks specifically, of which seven were ranked as red (low scoring), four as amber (intermediate scoring) and four as green (high scoring). Only the green options are taken forward to the shortlist and discussed further in this report.

Table 2.5 – RAG scores for sandbank compensation options (*denotes those measures that appear as two separate options in APPENDIX B).

COMPENSATION OPTION	RAG SCORE
*Maintaining sediment budget (use of agitation dredging only or commitment to depositing material within M&LS SAC)	RED
Management of navigational dredging methods	RED
Establishing new sandbank areas	RED
Microplastic and contaminant loading research	RED
Removal of marine non-native species	RED
Improving hydrodynamics	RED
Improving water quality	RED
*Fisheries management (spatial reduction or development of new management mechanism)	AMBER
Facilitating lost fishing gear retrieval	AMBER
Marine activity restrictions	AMBER
Aggregate dredging activity management	AMBER
Extending a SAC	GREEN
Redundant infrastructure removal	GREEN
Marine debris removal	GREEN
Marine debris awareness and engagement	GREEN

2.6.4 The RAG score was determined by a variety of criteria the main reasons for each red or amber-listed option not being deemed feasible is discussed briefly in APPENDIX A.

3. SHORTLISTED OPTIONS

3.1 OVERVIEW

3.1.1 The options ranked as Green in the RAG assessment described in Section 2 above were taken forward to the shortlist. The remainder of this report discusses each shortlisted option, as well as providing a conclusion on the findings from the shortlisting, and outlining next steps in the development of compensation options.

3.2 KITTIWAKE

3.2.1 The following kittiwake compensation options scored green as part of the RAG shortlisting procedure, and are thus taken forward to the shortlist:

- Artificial nest sites
- Fisheries management
- Directed offal discards
- Prey habitat enhancement
- Crow control
- Disturbance reduction

ARTIFICIAL NEST SITES

OPTION INFORMATION

3.2.2 This option would consist of increasing the number of available kittiwake breeding spaces by creating an artificial nest site, either by building a new onshore or offshore structure, or by repurposing an existing offshore structure (e.g. a defunct rig). It is worth noting that a number of offshore installations which support breeding kittiwake are due for decommissioning relatively soon. The provision of additional nesting spaces can thus also alleviate this anticipated shortfall in suitable nesting opportunities.

SHORTLISTING RATIONALE

3.2.3 This measure was shortlisted based on the known effectiveness of artificial nest sites for kittiwake (e.g. Lanctot *et al.* 2003; Turner, 2010). It should be noted that a number of recently consented OWFs (such as Hornsea Three OWF) are providing onshore artificial nest sites as compensation for kittiwake, and thus opportunities for any further onshore nest sites would need to be reviewed. Evidence suggests kittiwake productivity is higher offshore (Christensen-Dalsgaard *et al*., 2019).

INITIAL NEXT STEPS

3.2.4 Site selection of an artificial nest site should be commenced if this option is to be progressed. A large amount of information exists in the public domain which can support this process. In addition, rate of recruitment into a proposed new breeding colony, as well as emigration back into the SPA network, will need to be better understood through a review of the scientific literature and past artificial nest projects.

FISHERIES MANAGEMENT

OPTION INFORMATION

3.2.5 The aim of fisheries management as a compensation option is to improve food availability, with the aim of increasing productivity of kittiwake by increasing stocks of key prey such as sandeel and sprat. In terms of delivery, fisheries management may include a reduction in fisheries quota, the purchase of fisheries quota, or the closure of fisheries areas.

SHORTLISTING RATIONALE

3.2.6 Fisheries management was shortlisted as reductions in fish stocks and seabird prey availability are known to affect seabird populations and productivity (e.g. Oro & Furness, 2002; Carroll *et al.*, 2017). Reducing fishing pressure can be a highly effective way of increasing fish stocks, benefiting a multitude of seabird species.

INITIAL NEXT STEPS

3.2.7 There is currently no mechanism for individual OWF developers to manage fisheries as a compensation measure, thus substantial work on delivery mechanisms would be needed before this could be implemented as a compensation measure. Work with other developers, government and the fishing industry is needed to develop approaches for the strategic delivery of compensation through fisheries management. Given these challenges, next steps will include investigating whether this strategic compensation option can be feasibly realised within the VE OWF timelines.

3.2.8 In order to understand the extent (e.g. size of closure area, scale of quota reduction) at which this measure would need to be implemented to deliver the required levels of compensation, further research is needed to better understand the links between fish stocks and kittiwake productivity. Should this compensation option be investigated further, it is envisaged that this research would be conducted as a literature review in the first instance.

DIRECTED OFFAL DISCARDS

OPTION INFORMATION

3.2.9 The aim of directed offal discarding is to improve kittiwake food availability and therefore productivity by working with the fishing industry to discard fisheries offal close to colonies and away from fishing activities. Kittiwake are known to feed on fisheries offal (Coulson, 2011).

SHORTLISTING RATIONALE

3.2.10 This measure was shortlisted because kittiwake productivity is known to be affected by poor food availability (Oro & Furness, 2002; Carroll *et al*., 2017), thus increasing food availability through directed offal discards would be a targeted, technically feasible way of increasing food availability near kittiwake breeding sites.

INITIAL NEXT STEPS

3.2.11 Next steps for this compensation measure would be to conduct literature research into the effectiveness and delivery mechanism of this measure. In addition, it will be important to investigate any potential negative side effects, in particular effects on non-target species and the wider food chain. Should this measure be deemed feasible after those investigations, engagement with the fishing industry should be commenced, alongside site selection for implementation. Furthermore, the delivery of alternative food resources (such as whole sandeel via purchased quota fished on behalf of the measure) could be investigated.

PREY HABITAT ENHANCEMENT

OPTION INFORMATION

3.2.12 This measure consists of improving or creating new nursery habitats to enhance fish populations and kittiwake prey availability, thereby improving kittiwake productivity.

SHORTLISTING RATIONALE

3.2.13 This measure was shortlisted because of its technical feasibility, as there are well-established techniques for carrying out habitat enhancement and creation for features that are known to provide important nursery resources such as seagrass. The measure also scored high on environmental value; seagrass habitat creation could bring benefits to a wide variety of marine species. Kittiwake use shallow coastal waters with seagrass as foraging habitat, and more generally are known to feed on the fish species that are supported by seagrass sites (Unsworth & Butterworth, 2021).

INITIAL NEXT STEPS

3.2.14 Further research into the links between important nursery, fish and seabird breeding and/or populations sizes is needed. In addition, selection of potential sites for seagrass creation or restoration needs to be commenced, and potential delivery partners and stakeholders identified and contacted.

CROW CONTROL

OPTION INFORMATION

3.2.15 This compensation option would consist of managing local crow populations near kittiwake breeding sites in order to reduce predation of eggs and chicks, increasing productivity.

SHORTLISTING RATIONALE

3.2.16 This option was shortlisted as it scored high on technical feasibility, specificity and potential environmental value. It is however worth noting that despite scoring high overall and thus being shortlisted, it scored low on effectiveness, as there is only limited evidence found to date on crow predation being a potential limiting factor for kittiwake.

INITIAL NEXT STEPS

3.2.17 It will need to be determined whether crow predation is a likely limiting factor at any known breeding sites in order to understand if crow control has the potential to boost kittiwake productivity. Should it be decided that this option will be investigated further, this work can take place as a combination of literature research and consultation with local experts and site managers. There is the potential for this measure to be delivered in the proximity of FFC SPA.

DISTURBANCE REDUCTION

OPTION INFORMATION

3.2.18 Disturbance reduction measures include alternative trail development, signage installation and/or warden funding. The aim of these measures is to reduce anthropogenic disturbance at nest sites to improve kittiwake breeding success.

SHORTLISTING RATIONALE

3.2.19 This measure was shortlisted because kittiwake are known to be sensitive to anthropogenic disturbance (e.g. Sandvik & Barret, 2001), and there is evidence for the effectiveness of disturbance-reducing measures from research at bird breeding sites (e.g. Allbrook & Quinn, 2020; Dowling & Weston, 1999). Implementing measures to reduce disturbance are generally technically straightforward (e.g. installing signs, hiring and training wardens), and long-term planning and management was deemed highly feasible.

INITIAL NEXT STEPS

3.2.20 Next steps for this measure will be to identify sites where disturbance could be reduced, for example through literature review and consultation with site managers. It will also be key to ensure the measures are designed and sited in a way that ensures disturbance reduction is implemented above and beyond standard site management requirements, as to ensure the compensation measure provides additionality.

3.3 GANNET

3.3.1 The following gannet compensation options scored green as part of the RAG shortlisting procedure, and are thus taken forward to the shortlist:

- Artificial nest sites
- Directed offal discards
- Bycatch reduction
- Plastic waste removal from colonies
- Prey habitat enhancement

ARTIFICIAL NEST SITES

3.3.2 This option would consist of increasing the number of available gannet breeding spaces by creating an artificial nest site, either by building a new onshore or offshore structure, or by repurposing an existing offshore structure (e.g. a defunct rig).

SHORTLISTING RATIONALE

3.3.3 This measure was shortlisted based on the fact that the extent of implementation and long-term planning are deemed feasible, and there is a lack of suitable nesting locations within England.

INITIAL NEXT STEPS

3.3.4 Further research will need to be done into the effectiveness of artificial nesting in gannet, including exploring artificial nest site design, and likely rates of recruitment, breeding success and immigration. Site selection of artificial nest sites also needs to be commenced.

DIRECTED OFFAL DISCARDS

OPTION INFORMATION

3.3.5 The aim of directed offal discarding is to improve gannet food availability and productivity by working with the fishing industry to discard fisheries offal close to colonies and away from fishing activities.

SHORTLISTING RATIONALE

3.3.6 This measure was shortlisted as gannet are known to feed on discards (Patrick *et al.* 2015; Votier *et al.* 2010), thus increasing food availability through directed offal discards could be a targeted, technically feasible way of increasing food availability near gannet breeding sites.

INITIAL NEXT STEPS

3.3.7 Whilst there is evidence showing that discards are important in the gannet diet, it is not clear at this stage if, and to what extent, discard feeding could help improve productivity at specific UK breeding sites. Further literature research is needed to better map out the benefits and costs of discard feeding, in particular in the context of gannet productivity, to fully understand whether discard feeding can be a feasible compensation measure. In addition, it will be important to investigate any potential negative side effects, in particular effects on non-target species and the wider food chain. Should this measure be deemed feasible after those investigations, engagement with the fishing industry should be commenced, alongside site selection for implementation. Furthermore, the delivery of alternative food resources (such as whole sandeel via purchased quota fished on behalf of the measure) can be investigated.

BYCATCH REDUCTION

OPTION INFORMATION

3.3.8 Bycatch reduction consists of working with the fishing industry to install technology on fishing gear to reduce gannet bycatch, and thus increase survival rates.

SHORTLISTING RATIONALE

3.3.9 This measure was shortlisted because gannet bycatch is a well-established issue, in particular in longline fisheries (Northridge *et al.,* 2020). Existing technologies to reduce bycatch in longline fisheries are available, thus ensuring the compensation measure is technologically feasible.

INITIAL NEXT STEPS

3.3.10 Data availability on site-specific bycatch rates of gannets in UK waters is limited, and further work on site selection is thus needed to identify locations at which implementation of this measure is likely to bring the greatest benefits. In addition, further study or trial into the effectiveness of different bycatch reduction methods may be needed. Should suitable candidate sites and technologies be identified, engagement with the fishing industry and other stakeholders is to be commenced.

PLASTIC WASTE REMOVAL FROM COLONIES

OPTION INFORMATION

3.3.11 The aim of the removal of plastic waste from colonies is to increase gannet survival by reducing mortality from entanglement. It would be delivered through manual removal of plastic waste at breeding sites.

SHORTLISTING RATIONALE

3.3.12 This measure was shortlisted because the long-term planning, timing and extent of implementation were deemed highly feasible. In addition, the removal of plastic waste was deemed generally technically feasible, although potential effectiveness scored lower. This is due to the fact that whilst plastic waste can feasibly be removed from parts of colonies, where plastic is embedded in nests it can often not be removed without causing structural damage.

INITIAL NEXT STEPS

3.3.13 Further work is needed to understand whether there are currently accessible sites which could benefit from plastic waste removal, as well as understanding to the benefits when removal cannot be completed within the nests themselves. This could be completed through initial online research and engagement with local experts. Should potentially suitable sites be identified, further local stakeholder engagement should then be commenced.

PREY HABITAT ENHANCEMENT

OPTION INFORMATION

3.3.14 This measure consists of improving or creating new seagrass habitats to increase fish populations and seabird food availability, thereby increasing gannet productivity.

SHORTLISTING RATIONALE

3.3.15 This measure was shortlisted because of its technical feasibility, as there are well-established techniques for carrying out seagrass habitat creation. The measure also scored high on environmental value; seagrass habitat creation could bring benefits to a wide variety of marine species. Gannet are known to feed on the fish species that are supported by seagrass sites (Unsworth & Butterworth, 2021), but further work to understand the links between seagrass, fish and seabird breeding and/or populations sizes would be beneficial to better understand the scale of the benefits that this measure may deliver.

INITIAL NEXT STEPS

3.3.16 As outlined above, further research into the links between seagrass, fish and seabird breeding and/or populations sizes is needed. In addition, selection of potential sites for seagrass creation or restoration needs to be commenced, and potential delivery partners and stakeholders identified and contacted.

3.4 LESSER BLACK-BACKED GULL

3.4.1 The following lesser black-backed gull compensation options scored green as part of the RAG shortlisting procedure, and are thus taken forward to the shortlist:

- Supplementary feeding
- Predator exclusion fencing
- Predator management
- Disturbance reduction
- Habitat creation

SUPPLEMENTARY FEEDING

OPTION INFORATION

3.4.2 This option consists of providing supplementary food near or at lesser black-backed gull breeding sites, with the aim of increasing productivity.

SHORTLISTING RATIONALE

3.4.3 This option was shortlisted because it is deemed technically feasible, and food availability is a known limiting factor for lesser black-backed gull, and there is evidence for the effectiveness of supplementary feeding (Butness *et al.,* 2010; Hiom *et al.* 1991).

INITIAL NEXT STEPS

3.4.4 Further literature research is needed to better map out the benefits and costs of supplementary feeding in lesser black-backed gull. It will be important to investigate any potential negative side effects, in particular effects on non-target species and the wider food chain.

PREDATOR EXCLUSION FENCING

OPTION INFORMATION

3.4.5 This compensation option consists of erecting predator-proof fencing around a breeding colony, with the aim of reducing nest predation and thereby increasing breeding success.

SHORTLISTING RATIONALE

3.4.6 This measure was selected as it is technically feasible, with existing technology in place, and is known to be effective for lesser black-backed gull (e.g. Davis *et al.* 2018).

INITIAL NEXT STEPS

3.4.7 A key next step for this measure is to identify potential sites where predator-exclusion fencing could be installed, as options within AOE SPA itself may be fully taken up by other developers. Options could include delivering this measure in the proximity of AOE SPA, or within or outside another SPA site. It will also be key to ensure that fencing is implemented in a way that goes above and beyond standard site management requirements, as to ensure the compensation measure provides additionality. Following the exploration of potential sites, stakeholder engagement is to be commenced.

PREDATOR MANAGEMENT

OPTION INFORMATION

3.4.8 Predator management covers the lethal and non-lethal control of nest predators of lesser black-backed gull, with the aim of increasing colony productivity.

SHORTLISTING RATIONALE

3.4.9 This measure was selected based on its technical feasibility and effectiveness; predator control is used widely across conservation projects, and lesser black-backed gull colonies are known to be impacted by predation (e.g. Davis *et al.* 2018).

INITIAL NEXT STEPS

3.4.10 Next steps will consist of identifying (SPA and non-SPA sites) lesser black-backed gull colonies which could benefit from predator management, as well as engaging with stakeholders, identifying appropriate management techniques and estimating the necessary scale of implementation. Similar to predator fencing, the predator control measures should go above and beyond standard site management requirements, as to ensure the compensation measure provides additionality.

DISTURBANCE REDUCTION

OPTION INFORMATION

3.4.11 Disturbance reduction measures include for example alternative trail development, signage installation and/or warden funding. The aim of these measures is to reduce anthropogenic disturbance at nest sites to improve lesser black-backed gull breeding success.

SHORTLISTING RATIONALE

3.4.12 There is evidence for the effectiveness of disturbance-reducing measures from research at bird breeding sites (e.g. Allbrook & Quinn, 2020; Dowling & Weston, 1999). Implementing measures to reduce disturbance are generally technically straightforward (e.g. installing signs, hiring and training wardens), and long-term planning and management was deemed highly feasible.

INITIAL NEXT STEPS

3.4.13 Next steps for this measure will be to identify sites where disturbance is a concern, for example through literature review and consultation with site managers. It will also be key to ensure the measures are designed and sited in a way that ensures disturbance reduction is implemented above and beyond standard site management requirements, as to ensure the compensation measure provides additionality.

HABITAT CREATION

OPTION INFORMATION

3.4.14 Habitat creation consists of the creation (or potentially re-creation/restoration) of lesser black-backed gull breeding habitat, with the aim of increasing the breeding population size.

SHORTLISTING RATIONALE

3.4.15 This measure was shortlisted as habitat creation is deemed technically feasible and effective and could be delivered at scale. To date the advice from NE has been to explore the options for this to secured on land adjacent to but outside the boundary of AOE SPA.

INITIAL NEXT STEPS

3.4.16 Initial next steps would include the identification of sites where a shortage of suitable habitat exists, and to start engagement with the relevant stakeholders.

3.5 SANDBANKS

3.5.1 The following sandbank compensation options scored green as part of the RAG shortlisting procedure, and are thus taken forward to the shortlist:

- Extending a SAC
- Redundant infrastructure removal
- Marine debris removal
- Marine debris removal awareness and engagement

EXTENDING A SAC

OPTION INFORMATION

3.5.2 This option refers to changing the boundary (extending the area) of an existing SAC designated for sandbanks to include an additional area of qualifying sandbank habitat.

SHORTLISTING RATIONALE

3.5.3 This measure will demonstrate that any sandbank habitat loss is offset, or compensated for, by increasing the area of designated sandbanks within the region which will in turn ensure that legal protection is afforded to the newly designated area thereby maintaining the ecological coherence of the sandbank network in the region. It is also considered to be of high environmental value to other species of conservation importance.

INITIAL NEXT STEPS

3.5.4 Although this is considered to be a feasible option as European marine site extensions have taken place in the past (see Outer Thames Estuary SPA extension[1]), there is considerable uncertainty around which site (if not M&LS SAC) is suitable for extension and the relevant administrative/legal processes to initiate following the UK's Exit from the EU. This is likely to be an industry-wide collaborative effort so initial identification of data sets showing suitable sandbank areas are required, as well as engagement with stakeholders, regulators and other developers.

REDUNDANT INFRASTRUCTURE REMOVAL

OPTION INFORMATION

3.5.5 This option refers to the removal of redundant infrastructure (I.e., a pipeline no longer in use) that is laid on the surface of sandbank habitat within a SAC designated for sandbanks in the region (if not M&LS SAC).

SHORTLISTING RATIONALE

3.5.6 This measure will demonstrate that any sandbank habitat loss is offset, or compensated for, by reinstating an area (freeing up a previously lost area) of qualifying sandbank habitat within the region, thereby maintaining the ecological coherence of the sandbank network. This is additional to the requirements of any existing site management and is considered to be technically deliverable before the effects of habitat loss is evident. Furthermore, it is expected to have a beneficial effect on the local hydrodynamic regime.

INITIAL NEXT STEPS

3.5.7 Infrastructure within the wider sandbank system of the southern North Sea that is suitable for removal needs to be identified, as well as an understanding of its ownership and legal requirements or restrictions on its removal. Any habitat disturbance effects should also be investigated in the instance that any structure has been colonised as well as engagement with stakeholders, regulators and other seabed users/owners.

MARINE DEBRIS REMOVAL

OPTION INFORMATION

3.5.8 This option refers to the removal of marine litter within the boundary of M&LS SAC.

[1] https://www.gov.uk/government/consultations/outer-thames-estuary-special-protection-area-extension-comment-on-proposals

SHORTLISTING RATIONALE

3.5.9 This measure will demonstrate that any sandbank habitat loss is offset, or compensated for, by reinstating an area of qualifying sandbank habitat within the region, thereby maintaining the ecological coherence and general health of the sandbank network. This is additional to the requirements of any existing site management and is technically deliverable before the effects of habitat loss is evident. Furthermore, it is expected to achieve broader marine net gain; nevertheless, it is noted that NE are not supportive of this measure, but it has been given weight in this assessment owing to the precedent of including it in the DCOs of previous projects.

INITIAL NEXT STEPS

3.5.10 Debris within the SAC needs to be identified to understand if the required volume of litter or waste is present to offset any habitat loss impacts and whether this would be an ongoing operation. Early engagement with stakeholders, regulators and other seabed users/owners is required as it is noted that an agreement on quantities and timescales for marine debris removal has been challenging for projects delivering compensation to sandbank habitats.

MARINE DEBRIS REMOVAL AWARENESS AND ENGAGEMENT

OPTION INFORMATION

3.5.11 This option aims to fund efforts to reduce the volume of debris/litter/fishing equipment being discharged into the marine environment. Awareness and engagement will likely take place in the form of events with the general public and production of information leaflets, as well as information on improved disposal and recycling.

SHORTLISTING RATIONALE

3.5.12 This option supports the *Marine debris removal* option which will demonstrate that any sandbank habitat loss is offset, or compensated for, by reinstating an area (freeing up a previously lost area) of qualifying sandbank habitat within the region, thereby maintaining the ecological coherence and general health of the sandbank network. This is additional to the requirements of any existing site management and is technically deliverable before the effects of habitat loss is evident. Furthermore, it is expected to achieve broader marine net gain.

INITIAL NEXT STEPS

3.5.13 Sources of debris within the SAC need to be identified to target specific users or groups to adequately offset any habitat loss impacts and avoid sabotaging the efforts of debris removal actions. An understanding of whether this would be an ongoing operation is needed as well as the organisations to collaborate with.

4. CONCLUSIONS

4.1.1 This report outlined the shortlisting process for identifying potential compensation measures for VE OWF while also providing a high-level rationale for shortlisted options. It is important to note that not all measures are likely to be taken forward from the shortlisting: rather, the approach to date provides a basis to determine feasible measures which will be investigated by the project in further detail. Further development of VE specific compensation packages will also take into account and support developments in strategic compensation options that may become available through engagement with other project developers.

4.1.2 The following kittiwake compensation options scored green as part of the RAG shortlisting procedure, and were thus taken forward to the shortlist:

- Artificial nest sites
- Fisheries management
- Directed offal discards
- Prey habitat enhancement
- Crow control
- Disturbance reduction

4.1.3 The following gannet compensation options scored green as part of the RAG shortlisting procedure, and were thus taken forward to the shortlist:

- Artificial nest sites
- Directed offal discards
- Bycatch reduction
- Plastic waste removal from colonies
- Prey habitat enhancement

4.1.4 The following lesser black-backed gull compensation options scored green as part of the RAG shortlisting procedure, and were thus taken forward to the shortlist:

- Supplementary feeding
- Predator exclusion fencing
- Predator management
- Disturbance reduction
- Habitat creation

4.1.5 The following sandbank compensation options scored green as part of the RAG shortlisting procedure, and were thus taken forward to the shortlist:

- Extending a SAC
- Redundant infrastructure removal
- Marine debris removal
- Marine debris awareness and engagement

5. NEXT STEPS

5.1.1 For the shortlisted options deemed most feasible, implementation roadmaps outlining the steps towards delivery of the compensation measure will be created. In addition to the “initial next steps” outlined in this document for each measure, literature research will be conducted to fill further knowledge gaps, and where relevant, site selection and stakeholder engagement will commence.

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APPENDIX A. RED AND AMBER-LISTED OPTIONS

This appendix provides an overview of the key reasons for not deeming red- and amber-listed compensation options feasible for further consideration.

KITTIWAKE

A.1 Exclusion of great skua: Great skua predation is unlikely to be a limiting factor for kittiwake populations, and as such, this option was not deemed suitable compensation option.

A.2 Oil spill management improvements: This option, consisting of improving the management of oil spills to reduce gull mortalities, was deemed unsuitable for shortlisting due to the fact that there are unlikely to be substantial improvements that can be made to current regulations.

A.3 Construction of storm defences near colony: The construction of storm defences near a colony was proposed as a potential measure to reduce breeding season mortalities. However, this option was not suitable for shortlisting due to a lack of evidence on both effectiveness and technical feasibility.

A.4 Kittiwake bycatch reduction: The installation of equipment or technology to reduce bycatch on fishing vessels was included in the longlist as a potential option to reduce gull mortalities. However, this option was considered unsuitable for shortlisting due to the lack of knowledge on bycatch numbers, and shortage of evidence on appropriate technical designs.

A.5 Provisioning of nest materials: There is no current evidence on nest materials being a potential limiting factor for breeding kittiwake. Whilst this option could be considered as a supporting measure, for example alongside the installation of artificial nesting structures, it is not considered to be a suitable standalone compensation option.

A.6 Sandeel alternatives research funding: Sandeel are fished for a variety of human uses, including for producing fishmeal, used to feed for example farmed salmon and pigs. This compensation option consists of funding research and trials into sandeel alternatives for pig and salmon feed, with the aim of reducing demand for sandeel and increasing seabird food availability. This compensation option was not taken forward to the shortlist due to the fact that there are already initiatives focusing on reducing fishmeal use. In addition, this option is unlikely to measurably benefit kittiwake numbers within the timeframe of OWF operation.

A.7 Mammalian predator management: Mammalian predator management (e.g. predator control), was not deemed a viable compensation option due to a lack of evidence that mammalian predation is a key issue for the kittiwake population.

A.8 Plastic waste removal from colonies: Plastic entanglement is unlikely to be a substantial issue for kittiwake, and as such, this compensation option was considered unsuitable.

A.9 Peregrine falcon alternative prey enhancement: Enhancing the availability of alternative prey for peregrine falcon to reduce predation pressures on kittiwake was not a shortlisted option due to the indirectness of this measure, which would make it challenging to evidence effectiveness.

A.10 Watersports engagement: Engagement with the watersports industry was longlisted as a potential compensation option to reduce disturbance to gulls. This option was deemed not viable as a standalone compensation measure due to the difficulties of quantifying the impact and effectiveness of such a measure.

A.11 Supplementary feeding: Supplementary feeding was considered to be too indirect a measure, however, this option could be considered as a supporting measure alongside other compensation options.

A.12 Engagement funding on plastics and marine litter: Funding engagement initiatives to reduce plastics and marine litter was longlisted as a potential compensation option to reduce entanglement mortality. This option was deemed not viable as a standalone compensation measure due to the difficulties of quantifying the impact and effectiveness of such a measure.

A.13 Marine SPA creation: The creation of a marine SPA was proposed as a potential measure to increase protections of kittiwake foraging grounds. However, due to the technical and regulatory challenges involved, this option was not deemed suitable for shortlisting.

A.14 Peregrine falcon diversionary feeding: Diversionary feeding of peregrine falcon to reduce predation pressures on kittiwake was not a shortlisted option due to the indirectness of this measure, which would make it challenging to evidence effectiveness.

GANNET

A.15 Oil spill management improvements: This option, consisting of improving the management of oil spills to reduce gull mortalities, was deemed unsuitable for shortlisting due to the fact that there are unlikely to be substantial improvements that can be made to current regulations.

A.16 Provisioning of nest materials: Providing nest materials for breeding gannet was deemed too indirect to provide a suitable compensation option and was thus not shortlisted. This option could however be considered as a supporting measure alongside other compensation options.

A.17 Sandeel alternatives research funding: Sandeel are fished for a variety of human uses, including for producing fishmeal, used to feed for example farmed salmon and pigs. This compensation option consists of funding research and trials into sandeel alternatives for pig and salmon feed, with the aim of reducing demand for sandeel and increasing seabird food availability. This compensation option was not taken forward to the shortlist due to the fact that there are already initiatives focusing on reducing fishmeal use. In addition, this option is unlikely to measurably benefit gannet numbers within the timeframe of OWF operation.

A.18 Supplementary feeding: Supplementary feeding was considered to be too indirect a measure, however, this option could be considered as a supporting measure alongside other compensation options.

A.19 Disturbance reduction: Disturbance reduction (e.g. warden funding, alternative trail development, signage) was longlisted as a measure to improve gannet breeding success. Whilst there is evidence of this species being sensitive to disturbance, and disturbance reduction measures being effective (Allbrook & Quinn, 2020), this option was not shortlisted. This was due to the fact that it is unlikely that sites to deliver disturbance reduction for gannet are available, with disturbance reduction measures being already in place at UK gannetries with (nearby) human presence.

A.20 Fisheries management: This option comprises of reducing fishing pressures to increase fish stocks and thus food availability for seabirds. This could be achieved through fisheries closures, reductions in fisheries quota, or fisheries quota purchases. However, as gannet is known to prey-switch, and shows low vulnerability to the abundance of for example sandeel (Furness and Tasker, 2000), a reduction in fishing effort for specific fish species is thus unlikely to give enough benefits to provide sufficient compensation. However, any benefits to gannet could be taken into consideration should this compensation option be taken forward for other species.

A.21 Aquaculture entanglement reduction: This option consists of reducing entanglement of gannet in aquaculture netting. This option was not deemed feasible as most entanglement issues are related to discarded aquaculture waste, and there is

therefore only limited site-specific opportunities, unlikely to provide sufficient compensation.

A.22 Enhancing colony establishment: Enhancing colony establishment, for example through the use of playbacks and decoys, was deemed to be too indirect a measure to be shortlisted as a standalone compensation option. However, colony enhancement techniques could be used alongside other compensation options where relevant.

A.23 Ending gannet chick harvest: Legal harvesting of gannet chicks takes place annually on the Scottish island of Sula Sgeir (Trinder, 2016). The compensation option of ending chick harvest, with the aim of increasing population growth, was deemed unviable due to the cultural importance of the annual harvest tradition.

A.24 Watersports engagement: Engagement with the watersports industry was longlisted as a potential compensation option to reduce disturbance to gulls. This option was deemed not viable as a standalone compensation measure due to the difficulties of quantifying the impact and effectiveness of such a measure.

A.25 Engagement funding on plastics and marine litter: Funding engagement initiatives to reduce plastics and marine litter was longlisted as a potential compensation option to reduce entanglement mortality. This option was deemed not viable as a standalone compensation measure due to the difficulties of quantifying the impact and effectiveness of such a measure.

A.26 Marine SPA creation: The creation of a marine SPA was proposed as a potential measure to increase protections of foraging grounds. However, due to the technical and regulatory challenges involved, this option was not deemed suitable for shortlisting.

LESSER BLACK-BACKED GULL

A.27 Herring gull control: This compensation option consists of controlling herring gull numbers in order to reduce competition and nest predation. This option was deemed infeasible as herring gull are red-listed and furthermore are no longer included under general licences for lethal control (Natural England, 2021).

A.28 Oil spill management improvement: This option, consisting of improving the management of oil spills to reduce gull mortalities, was deemed unsuitable for shortlisting due to the fact that there are unlikely to be substantial improvements that can be made to current regulations.

A.29 Artificial nest sites: The provision of artificial nest sites to increase breeding numbers of lesser black backed gull was not viewed as a feasible compensation option at this stage, largely due to the lack of evidence on technical feasibility and effectiveness of such a measure for this species.

A.30 End lesser black-backed gull culling: Ending lesser-black backed gull culling was considered not to be a viable compensation option due to the fact that lesser black-backed gull, as of 2019, is no longer included in general licences to kill. As such, there is thought to be little scope to reduce numbers culled (Natural England, 2021).

A.31 Fisheries management: This option comprises of reducing fishing pressures to increase fish stocks and thus food availability for seabirds. This could be achieved through fisheries closures, reductions in fisheries quota, or fisheries quota purchases. Whilst food availability is thought to be a limiting factor for lesser black-backed gull (Bukacinski *et al.*, 1998; JNCC, 2021), the species feeds on a wide range of prey (Ross-Smith *et al.*, 2014) and a reduction in fishing effort for specific fish species is thus unlikely to give enough benefits to provide sufficient compensation.

A.32 Air space user engagement: Engagement with air space users was longlisted as a potential compensation option to reduce disturbance to lesser black-backed gulls. This option was deemed not viable due to a lack of evidence of effectiveness.

A.33 Lesser black-backed gull bycatch reduction: The installation of equipment or technology to reduce bycatch (e.g. deterrents) on fishing vessels was included in the longlist as a potential option to reduce gull mortalities. However, this option was considered unsuitable for shortlisting due to the lack of knowledge on bycatch numbers, and shortage of evidence on appropriate technical designs.

A.34 Marine SPA creation: The creation of a marine SPA was proposed as a potential measure to increase protections of for example lesser black-backed gull foraging grounds. However, due to the technical and regulatory challenges involved, this option was not deemed suitable for shortlisting.

SANDBANKS

A.35 Maintaining sediment budget (use of agitation dredging only or commitment to depositing material within M&LS SAC): the two options identified for ensuring sediment is retained within the system will not likely compensate for the loss of sandbank habitat since they only ensure that there is no AEoI, rather than being a measure that will deliver additional habitat as a consequence of AEoI (I.e. they are mitigation options – not compensation options). In addition to not being effective, these options are not considered to be deliverable at an appropriate extent/within a measurable timeframe.

A.36 Management of navigational dredging methods (sole use of agitation dredging): this option aims to ensure that sediment is retained within the system; however, this does not compensate for the loss of sandbank since it only ensures that there is no AEoI, rather than being a measure that will deliver additional habitat as a consequence of AEoI (I.e. they are mitigation options – not compensation options) and the ports and shipping industry already use this as standard best practice. In addition to not being effective, this option is not considered to be deliverable at an appropriate extent/within a measurable timeframe.

A.37 Establishing new sandbank areas: as this would be an offsite intertidal measure it is not directly connected to areas of Annex I sandbank as there is no evidence that this will be of benefit to this or any other similar feature. Also, maintaining habitats ensures that there is no AEoI, rather than being a measure that will deliver additional habitat so will neither be effective, nor delivered at an appropriate extent/within a measurable timeframe.

A.38 Microplastic and contaminant loading research: as this would also be an offsite measure it is not necessarily specifically connected to areas of Annex I sandbank and does not address the loss of sandbank habitat. Nevertheless, this may be a useful aspiration to include under marine net gain.

A.39 Removal of marine non-native species: does not address the loss of sandbank habitat and measuring/monitoring success of this measure is impossible. Nevertheless, this may be a useful aspiration to include under marine net gain.

A.40 Improving hydrodynamics: this option will not replace sandbank habitat that is lost and there are currently no informed methods to monitor success of this measure.

A.41 Improving water quality: since most marine pollutants originate from the terrestrial environment this would also be an offsite measure and is therefore not necessarily specifically connected to areas of Annex I sandbank. Furthermore, it does not address the loss of sandbank habitat. Nevertheless, this may be a useful aspiration to include under marine net gain.

A.42 Fisheries management (spatial reduction or development of new management mechanism): the two options under this category do not specifically compensate for

habitat loss, rather they address disturbance to habitats. Furthermore, spatial reductions/restrictions or exclusion zones are part of standard site management and so it is difficult to demonstrate additionality unless a new fisheries management mechanism could be developed. This is potentially feasible but not likely to be achievable within the required timeframe.

A.43 Facilitating lost fishing gear retrieval: this option was proposed as a potential measure to reinstate areas of sandbank habitat to offset loss and to improve general sandbank health. However, due to the technical challenges involved, this option was not deemed suitable for shortlisting.

A.44 Marine activity restrictions: due to the high level of anthropogenic activity in area it is unlikely that all activities can be reasonably restricted. Furthermore, this option is not specific to offsetting habitat loss, so it has not been shortlisted.

A.45 Aggregate dredging activity management: engaging with the aggregates industry and The Crown Estate would be very complex and difficult with regard to reducing aggregate dredging activities given that licences are active within M&LS SAC until 2035. It would also be difficult to over-compensate via this option. Therefore, this option has not been shortlisted.

5 SHORTLISTED ORNITHOLOGICAL COMPENSATION OPTIONS – NEXT STEPS (MAY 2023)

FIVE ESTUARIES
OFFSHORE WIND FARM

FIVE ESTUARIES OFFSHORE WIND FARM

SHORTLISTED ORNITHOLOGICAL COMPENSATION OPTIONS - NEXT STEPS

Document Reference	004755321-01
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Project	Five Estuaries Offshore Wind Farm
Sub-Project or Package	Work Package 1
Document Title	Shortlisted Ornithological Compensation Options - Next Steps
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Revision	Date	Status/Reason for Issue	Originator	Checked	Approved
A	May-23	Final for issue	GoBe	GoBe	VE OWFL

CONTENTS

DEFINITION OF ACRONYMS

Term	Definition
AEoI	Adverse Effects on Integrity
AOE	Alde-Ore Estuary
DCO	Development Consent Order
FFC	Flamborough & Filey Coast
HRA	Habitats Regulations Assessment
IROPI	Imperative reasons of overriding public interest
LSE	Likely Significant Effect
MMF	Mean-max foraging range
RAG	Red, Amber, Green
RIAA	Report to Inform Appropriate Assessment
SD	Standard Deviation
SPA	Special Protection Area
VE	Five Estuaries Offshore Wind Farm
VE OWFL	Five Estuaries Offshore Wind Farm Limited

1 INTRODUCTION

1.1 BACKGROUND

FIVE ESTUARIES OFFSHORE WIND FARM

1.1.1 Five Estuaries Offshore Wind Farm (VE) is a proposed extension to the operational Galloper Offshore Wind Farm. VE will be situated approximately 37 km off the coast of Suffolk, England (at its closest point).

1.1.2 As part of the Development Consent Order (DCO) application, Five Estuaries Offshore Windfarm Ltd (VE OWFL) is required to produce a Report to Inform Appropriate Assessment (RIAA) in order to provide the information required by the Competent Authority in order to undertake its Habitats Regulation Assessment (HRA) and Appropriate Assessment. If the HRA process concludes that Adverse Effects on Integrity (AEoI) cannot be excluded, a derogation process is followed. In the event that no alternative solutions can be found, and if there are imperative reasons of overriding public interest (IROPI), the final stage of the derogation process is to develop measures to compensate for adverse effects on the integrity of a site.

DEROGATION PREPARATION

1.1.3 In order to allow for sufficient time to engage with stakeholders and develop robust compensation plans for impacts that have the potential to cause AEoI at a designated site, VE OWFL is investigating compensation options at this stage in the pre-application period, but it should be noted that this does not prejudice the outcome of the ongoing HRA process.

1.1.4 Based on assessments completed at this early stage of the process, VE OWFL is investigating compensation options for species deemed likely to require compensation, this includes lesser black backed gull of the Alde-Ore Estuary (AOE) Special Protection Area (SPA). In terms of kittiwake and gannet of the Flamborough and Filey Coast (FFC) SPA, the applicant maintains a conclusion of no AEoI, however a without prejudice derogation case has been presented for these species, in the event that the Secretary of State disagrees with this position.

AOE SPA

1.1.5 AOE SPA is 15 km away from the VE array, which is within the mean-max foraging range (MMF) of breeding lesser black-backed gull, a protected feature of AOE SPA. There is therefore potential connectivity between the SPA and VE array during the breeding and non-breeding seasons for this species. Lesser black-backed gull is considered a collision risk species due to their flight behaviour and there has been concern raised by Natural England (NE) regarding the impacts on this feature from other OWF projects, as demonstrated by recent decisions on other offshore wind projects (e.g. Norfolk Boreas, Norfolk Vanguard, East Anglia ONE North and East Anglia TWO) which concluded that AEoI could not be ruled out for lesser black-backed gull at AOE SPA when considered in-combination with other projects. The conclusion of AEoI in respect of the other projects increases the likelihood that the same conclusion for this project will be reached. Given the proximity of VE to the AOE SPA and results of preliminary assessment, it is considered likely that there will be an AEoI in relation to the LBBG feature of the AOE SPA from VE in-combination with other projects, and that compensation for this effect will thus be required.

FFC SPA

1.1.6 FFC SPA is 251 km from the VE array. VE screening (VE OWFL, 2021) concluded potential for Likely Significant Effect (LSE) for two species which are qualifying features of this SPA; kittiwake and gannet. Given the distance of VE from the FFC SPA and results of preliminary assessment, any impacts on kittiwake and gannet from VE are predicted to be very small (predicted additional mortality of less than one individual per annum), and indistinguishable from natural fluctuations in the population (as presented in the draft VE RIAA). It is therefore not considered likely that impacts are of a significant magnitude to make a material contribution to natural mortality rates, and thus VE OWFL do not anticipate compensation will be required for kittiwake and gannet. However, concerns regarding impacts on kittiwake and gannet have been raised for other OWF projects in the North Sea, and in addition the SoS has concluded an AEoI at FFC SPA due to in-combination collision mortality for a number of consented projects within the southern North Sea. In anticipation that similar concerns may be raised in relation to VE, VE has therefore commenced the preparation of compensation plans for kittiwake and gannet on a without prejudice basis, in the event that the Secretary of State determines that compensation will be required for these species.

1.1.7 VE OWFL has identified potential compensation measures for VE and created a longlist of all possible compensation options to offset their predicted impact at the relevant sites. The longlisted options are based on the existing VE project proposal, experience with HRA derogation matters in the UK and stakeholder feedback received to date. These longlisted options are discussed in 'Five Estuaries Offshore Wind Farm: Potential compensation measures longlist report' (VE OWFL, 2022a).

1.1.8 The longlist options were narrowed down to a shortlist following a ranking criteria assessment (otherwise known as a Red-Amber-Green (RAG) assessment) and discussed in 'Five Estuaries Offshore Wind Farm: Compensation measures shortlist technical note' (VE OWFL, 2022b). The ranking approach is provided in 'Five Estuaries Offshore Wind Farm: Compensation measures ranking approach note' (VE OWFL, 2022c). In short, longlisted measures were scored against a number of categories, with scores for each category summed to provide a total score. The measures were then allocated to “red”, “amber” and “green” groups based on their total score, and “green” measures taken forward to the shortlist of compensation options.

1.2 AIMS AND OBJECTIVES

1.2.1 This document sets out the next steps of compensation development for ornithological features. It assesses shortlisted compensation options (VE OWFL, 2022b) that are deemed most suitable to take forward for further development, based on available evidence, past project experience, expert judgement, and stakeholder feedback from Natural England. It then sets out proposed next steps for compensation development for each of the relevant species.

1.3 STRATEGIC COMPENSATION

1.3.1 It should be noted that whilst this document focuses on the delivery of compensation by VE OWFL alone, options for strategic delivery of compensation measures will also be explored. This includes measures developed through collaboration between multiple OWF projects and developers, as well as the potential for contributions to a centrally funded initiative, such as the planned Marine Recovery Fund.[1]

[1] Energy Security Bill factsheet: Offshore wind environmental improvement package. https://www.gov.uk/government/publications/energy-security-bill-factsheets/energy-security-bill-factsheet-offshore-wind-environmental-improvement-package. Accessed January 2023.

2 LESSER BLACK-BACKED GULL AT AOE SPA

2.1 SHORTLISTED OPTION SELECTION

2.1.1 The following lesser black-backed gull compensation options scored green as part of the RAG shortlisting procedure, and have therefore been taken forward to the shortlist:

- Supplementary feeding;
- Predator exclusion fencing;
- Predator management;
- Disturbance reduction; and
- Habitat creation.

2.1.2 Further details on each of these compensation options, and the rationale for shortlisting, are presented in 'Five Estuaries Offshore Wind Farm: Compensation measures shortlist technical note' (VE OWFL, 2022b).

2.1.3 Based on a high-level review of evidence for effectiveness and feasibility, expert judgement, and Natural England feedback on the longlist and shortlist of compensation options (VE OWFL, 2022a; VE OWFL, 2022b), supplementary feeding, predator management and disturbance reduction were deemed to represent less suitable options than predator exclusion fencing and habitat creation. Supplementary feeding was deemed to potentially have negative side effects on non-target species and the wider food chain. Predator management measures in order to reduce nest predation and competition was deemed to be a measure that could be implemented alongside predator exclusion fencing rather than a standalone measure. Disturbance reduction was deemed to be hard to quantify the impact with measures normally already in place at suitable breeding sites. At this stage therefore, focus is placed on further developing compensation through predator exclusion fencing and/or habitat creation. The other shortlisted compensation options could be revisited (or considered as a supporting measure) at a future date if deemed necessary or beneficial.

2.2 NEXT STEPS FOR COMPENSATION DEVELOPMENT

2.2.1 Next steps for the development of predator exclusion fencing and habitat creation will consist of:

- Collating and reviewing ecological evidence to demonstrate feasibility and effectiveness:
  - For predator exclusion fencing: review lesser black-backed gull predation issues and effectiveness of exclusion fencing for improving breeding performance and population size;
  - For habitat creation: review lesser black-backed gull habitat requirements and evidence of effectiveness of habitat creation;
- Developing a roadmap for compensation development and implementation;
- Site selection:
  - For predator exclusion fencing: identify breeding sites with a predation issue, assess the feasibility of installing predator exclusion fencing (including

ensuring additionality is provided), establish connectivity to AOE SPA or the wider national site network to ensure compensation meets the Habitat Regulations requirements of maintaining site network coherence;

- For habitat creation: identify sites, preferably near existing breeding sites/SPAs where habitat creation could improve LBBG breeding success and/or population size (i.e. sites where breeding habitat availability is limited). Potential limiting factors at candidate sites (e.g. predation, anthropogenic disturbance, conflicts with other land-uses), and ways to mitigate these, should also be taken into consideration. Establish connectivity to AOE SPA or the wider national site network to ensure compensation meets the requirements of maintaining site network coherence;
- Identifying key stakeholders and planning consultation;
- Developing an outline implementation plan; and
- Developing an outline monitoring plan.

2.2.2 It should be noted that following the identification of potential sites, details such as land ownership and any site constraints would need to be investigated by VE OWFL as part of the site selection process.

2.2.3 Next steps for compensation development could, where deemed beneficial, also include the identification of key knowledge and evidence gaps and designing and carrying out (desk-based or field-based) studies to fill these gaps.

3 KITTIWAKE AT FFC SPA

3.1 SHORTLISTED OPTION SELECTION

3.1.1 The following kittiwake compensation options scored green as part of the RAG shortlisting procedure, and have therefore been taken forward to the shortlist:

- Artificial nest sites;
- Fisheries management;
- Directed offal discards;
- Prey habitat enhancement;
- Crow control; and
- Disturbance reduction.

3.1.2 For further details on each of these compensation options, and the rationale for shortlisting, see 'Five Estuaries Offshore Wind Farm: Compensation measures shortlist technical note' (VE OWFL, 2022b).

3.1.3 Based on a high-level review of evidence for effectiveness and feasibility, expert judgement, and Natural England feedback on the longlist and shortlist of compensation options (VE OWFL, 2022a; VE OWFL, 2022b), the provision of artificial nest site was deemed the most feasible compensation option. Although fisheries management options can be a highly effective way of increasing fish stocks there is currently no mechanism for individual OWF developers to manage fisheries as a compensation measure, thus substantial work on delivery mechanisms would be needed before this could be implemented as a compensation measure. Directed offal discards were deemed to potentially have negative side effects on non-target species and the wider food chain. Prey habitat enhancement by creating new nursery habitats to enhance fish populations would have a high environmental value but further work to understand the links between seagrass, fish and seabird breeding and/or populations sizes would be beneficial to better understand the scale of the benefits that this measure may deliver. Crow control was deemed to lack enough evidence about the effectiveness of this measure having any impact of kittiwake populations. Disturbance reduction was deemed to be hard to quantify the impact with measures normally already in place at suitable breeding sites At this stage therefore, focus is placed on further developing compensation through delivering artificial nest sites. The other shortlisted compensation options could be revisited (or considered as a supporting measure) at a future date if deemed necessary or beneficial.

3.1.4 It should be noted that the assessment undertaken to date for VE does not reach a conclusion of AEoI for the kittiwake feature of the FFC SPA, and so these compensation plans are being developed on a without prejudice basis for this species, in the event that the Secretary of State determines that compensation would be required (see paragraph 1.1.6).

3.2 NEXT STEPS FOR COMPENSATION DEVELOPMENT

3.2.1 As preliminary assessment concludes that impacts from VE on kittiwake are likely to be very small and that there is no AEoI of the FFC SPA, the provision of entire artificial nesting structures, as proposed by other recent OWF projects, is not deemed proportionate in this context. For this reason, the next step in the development of kittiwake compensation comprises identifying sites where the addition of (small numbers of) artificial nest sites could benefit breeding kittiwake. This could include for example the installation of carved nesting ledges or metal kittiwake "hammocks" at or near existing breeding sites. This could be delivered through partnership with other organisations, for example through financial contributions to the improvement or expansion of existing and/or planned artificial nest sites for kittiwake. Alternatively, it could also be realised by VE OWFL leading on the identification and installation of new nesting sites independently. Following this, next steps will consist of:

- Contacting relevant parties to commence discussions about collaboration opportunities, and/or identifying sites for the delivery of smaller quantities of nest site provision (e.g. ledges or hammocks)
- Preparing ecological evidence documents
- Identifying stakeholders and planning consultation
- Developing outline implementation and monitoring plans

3.2.2 It should be noted that following the identification of potential sites, details such as financial agreements with partners or land owners, and feasibility of permission/purchase would need to be progressed by VE OWFL as part of the site selection process.

4 GANNET AT FFC SPA

4.1 SHORTLISTED OPTION SELECTION

4.1.1 The following gannet compensation options scored green as part of the RAG shortlisting procedure, and have therefore been taken forward to the shortlist:

- Artificial nest sites;
- Directed offal discards;
- Bycatch reduction;
- Plastic waste removal from colonies; and
- Prey habitat enhancement.

4.1.2 For further details on each of these compensation options, and the rationale for shortlisting, see 'Five Estuaries Offshore Wind Farm: Compensation measures shortlist technical note' (VE OWFL, 2022b).

4.1.3 Feasibility concerns were raised by stakeholders around the proposed compensation options for gannet, mostly due to the limited availability of evidence of their effectiveness. However, the above list is deemed to consist of the most feasible compensation options for gannet. Based on a high-level review of evidence for effectiveness and feasibility, expert judgement, and Natural England feedback on the longlist and shortlist of compensation options (VE OWFL, 2022a; VE OWFL, 2022b), bycatch reduction and the provision of artificial nesting sites were deemed the most feasible compensation options. Directed offal discards were deemed to potentially have negative side effects on non-target species and the wider food chain. Bycatch from entanglement was considered as a compensation measure, however there is limited knowledge on the effectiveness of different bycatch reduction methods at present. Prey habitat enhancement through the creation of Marine SPAs were considered, however due to the technical and regulatory challenges involved it was deemed unsuitable for shortlisting. Plastic waste removal from colonies was deemed not to be a highly effective compensation measure. Prey habitat enhancement by creating new nursery habitats to enhance fish populations would have a high environmental value but further work to understand the links between seagrass, fish and seabird breeding and/or populations sizes would be beneficial to better understand the scale of the benefits that this measure may deliver.

4.1.4 It should be noted that the assessment undertaken to date for VE does not reach a conclusion of AEoI for the gannet feature of the FFC SPA, and so these compensation plans are being developed on a without prejudice basis for this species,in the event that the Secretary of States determines that compensation would be required (see paragraph 1.1.6).

4.2 NEXT STEPS FOR COMPENSATION DEVELOPMENT

4.2.1 If, following the findings from the RIAA and subsequent consultation, it is deemed likely that compensation may be required for gannet, VE OWFL proposes to develop compensation proposals on a without prejudice basis with the following next steps:

- Review up-to-date evidence of benefits of bycatch reduction and/or artificial nesting in gannet
- Identify techniques and best practice for delivering bycatch reduction and/or the provision of artificial nest sites

- Identify delivery partners (e.g. fisheries partners, conservation organisations) to partner with for delivery and open discussions around suitable options and locations
- Collate an ecological evidence document
- Identify stakeholders and plan consultation
- Produce implementation and monitoring plans

4.2.2 It should be noted that following the identification of potential options, details such as land ownership and feasibility of permission/purchase (for new artificial nest sites) and contracts with partners (for bycatch reduction) would need to be progressed by VE OWFL as part of the compensation development process.

5 REFERENCES

VE OWFL (2021). Habitat Regulations Assessment Screening Report.

VE OWFL (2022a). 'Five Estuaries Offshore Wind Farm: Potential compensation measures longlist report'.

VE OWFL (2022b). 'Five Estuaries Offshore Wind Farm: Compensation measures shortlist technical note'.

VE OWFL (2022c). 'Five Estuaries Offshore Wind Farm: Compensation measures ranking approach note'.

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