



Hornsea Project Four

Volume B2, Annex 7.4: Compensation measures for FFC SPA: Kittiwake Onshore Artificial Nesting Roadmap

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01	-	-	Submitted at Application
02	Amended throughout	Amended throughout	Removal of Gannet from the document for Deadline 1
02	7	1	Position on kittiwake AEol conclusion
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Glossary

Term	Definition
Compensation / Compensatory Measures	If an Adverse Effect on the Integrity on a designated site is determined during the Secretary of State's Appropriate Assessment, compensatory measures for the impacted site (and relevant features) will be required. The term compensatory measures is not defined in the Habitats Regulations. Compensatory measures are however, considered to comprise those measures which are independent of the project, including any associated mitigation measures, and are intended to offset the negative effects of the plan or project so that the overall ecological coherence of the national site network is maintained.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Projects (NSIP).
In-Combination Effect	The effect of Hornsea Four in-combination with the effects from other plans and projects on the same feature/receptor.
Offshore Ornithology Engagement Group (OOEG)	The Hornsea Four Offshore Ornithology Engagement Group means the group that will assist, through consultation the undertaker in relation to the delivery of each compensation measures as identified in the kittiwake compensation plan and the razorbill and guillemot compensation plan. Matters to be consulted upon to be determined by the Applicant and will include site selection, project/study design, methodology for implementing the measure, monitoring, and adaptive management options as set out in the kittiwake compensation plan and the razorbill and guillemot compensation plan.
Planning Inspectorate (PINS)	The agency responsible for operating the planning process for Nationally Significant Infrastructure Projects (NSIPs).
Report to Inform Appropriate Assessment	The information that the Competent Authority needs to inform an Appropriate Assessment at Stage 2 of the HRA process and which has been provided by the Applicant in the RIAA (Volume 2, Annex 2: Report to Inform Appropriate Assessment).
Special Protection Area (SPA)	Strictly protected sites designated pursuant to Article 4 of the Birds Directive (via the Habitats Regulations) for species listed on Annex I of the Directive and for regularly occurring migratory species.
Black-legged kittiwake biogeographic population	The east Atlantic breeding population of kittiwake which includes individuals from the Flamborough and Filey Coast SPA (Stroud <i>et al.</i> , 2016). Proposed compensation measures will be undertaken within this populations breeding and migratory range.

Acronyms

Acronym	Definition
AEOI	Adverse Effect on Integrity
CfD	Contracts for Difference
DCO	Development Consent Order
FFC	Flamborough and Filey Coast
FID	Final Investment Decision
KIMP	Kittiwake Compensation Implementation and Monitoring Plan
GKIMP	Gannet and Kittiwake Compensation Implementation and Monitoring Plan
MMO	Marine Management Organisation
OOEG	Offshore Ornithology Engagement Group
PINS	Planning Inspectorate
RSPB	Royal Society for the Protection of Birds
SNCBs	Statutory Nature Conservation Bodies
SoS	Secretary of State
SPA	Special Protection Area
UK	United Kingdom

1 Introduction

- 1.1.1.1 This Onshore Artificial Nesting Roadmap document provides an overview of the anticipated next steps for implementation of an artificial nesting structure as a compensation measure for Hornsea Four, if deemed necessary by the Secretary of State following their Appropriate Assessment. The Applicant's preferred compensation measure for kittiwake is a repurposed offshore nesting structure, followed by a new offshore nesting structure. An onshore nesting structure is being considered as a compensation option for kittiwake, in case the preferred offshore structure cannot be delivered, or an onshore artificial nesting structure is deemed necessary by the Secretary of State. It should be noted that document will be updated as necessary and should an onshore compensation measure be required, it will be added to or revised as the Development Consent Order (DCO) application for Hornsea Four progresses. This roadmap sets out a clear pathway to demonstrate that the compensation measure can be secured and that the mechanism for delivery of the compensation measure can be implemented.
- 1.1.1.2 Following the Applicant's submission, the Applicant has revisited its conclusion of no potential for an adverse effect on integrity (AEol) in respect of the kittiwake feature of the Flamborough and Filey Coast Special Protection Area (FFC SPA) from Hornsea Four in combination with other plans and projects and concluded AEol on the FFC SPA in combination with other plans and projects. The Applicant maintains its position of no AEol alone or in combination for all other qualifying species of the FFC SPA and for all other European sites.
- 1.1.1.3 In the DCO Application the Applicant's proposed without prejudice compensatory measures for gannet and kittiwake were presented together in a single [Gannet and Kittiwake Compensation Plan \(APP-186\)](#). However, as set out in the Applicant's position paper ([AS-023](#)), the Applicant is updating the Report to Inform Appropriate Assessment (RIAA ([B2.2 Report to Inform Appropriate Assessment Part 1 \(APP-167\)](#) and [Part 4 \(APP-170\)](#) and its derogation case ([B2.5 Without Prejudice Derogation Case \(APP-182\)](#)) based on an overall conclusion that there is potential for an AEol on kittiwake at the FFC SPA from Hornsea Four in combination with other projects (see [Kittiwake Adverse Effects on Integrity \(AEol\) Conclusion \(AS-023\)](#)).
- 1.1.1.4 In light of the Applicant's updated position on kittiwake, it is considered appropriate to separate the compensatory measures for gannet ([FFC SPA: Gannet Compensation Plan](#); to be submitted at Deadline 5) and kittiwake ([FFC SPA: Kittiwake Compensation Plan \(APP-186\)](#)) into separate Roadmaps, Compensation Plans (and consequently separate Implementation and Monitoring plans), reflecting that compensatory measures for kittiwake are now considered necessary, whereas for gannet the Applicant remains confident there would be no AEol alone or in combination and the compensatory measures for gannet remain "without prejudice" measures. Therefore, this Roadmap has been updated to focus solely on kittiwake.

2 Description and Scope

- 2.1.1.1 The provision of an onshore artificial nest structure at a site to increase the annual recruitment of black-legged kittiwake, *Rissa tridactyla* (kittiwake) into the species biogeographic is considered a viable compensation measure for a potential AEol at the FFC SPA. This document provides the roadmap of next steps for Onshore Artificial Nesting.

- 2.1.1.2 The approach to site selection and design is primarily driven by ecological/habitat requirements of the ornithology interests to increase the likelihood of colonisation and ensure the success of the structure. The onshore artificial nesting structure will be located within one of two search zones (in East Suffolk, or between Cayton Bay and Newbiggin by the Sea). The structure will be designed to accommodate the level of compensation required with greater capacity available for kittiwake and will accord with the design principles and indicative maximum parameters set out below.
- 2.1.1.3 Kittiwake have been observed readily utilising man-made structures (APEM, 2021 and Niras, 2021) and therefore it is considered that the establishment of an artificial nest site would provide a viable and effective compensation option. Successful establishment of breeding colonies at a site would produce young, which would become part of the wider biogeographic population of kittiwake, thereby maintaining the coherence of the network of SPAs designated for kittiwake. The Ecological Evidence Reports ([B2.7.1 Compensation measures for FFC SPA: Offshore Artificial Nesting: Ecological Evidence \(APP-187\)](#), [B2.7.3 Compensation measures for FFC SPA: Onshore Artificial Nesting: Ecological Evidence \(APP-189\)](#)) set out the ecological evidence for the artificial nesting measures and supports likely successful compensation measures. In particular, the kittiwake population modelling document ([B2.7.1.1 Population modelling of black-legged kittiwake on the English east coast to identify the population of first-time breeders available to recruit to new colonies](#)) indicates there is an ample supply of immature birds searching for nest sites and available recruits for appropriately sited artificial nesting sites.

2.2 Scale of compensation

- 2.2.1.1 The potential collision mortality effect from Hornsea Four for the project alone is predicted to be 21 individuals. It is calculated that approximately 56.7 additional breeding pairs will be required to compensate for the potential effect (see [B2.2: Report to Inform Appropriate Assessment \(APP-167\)](#) and [B2.7 FFC SPA: Kittiwake and Gannet Compensation Plan \(APP-186\)](#) for further details on the predicted effects and compensation package). An additional population of kittiwake could be accommodated on an onshore artificial nesting structure. A colony of over 400 pairs of kittiwakes could easily be supported by an artificial nesting structure from initial reviews of structure designs (see [Section 6](#)) and therefore provide for the required additional breeding pairs (presented in [Table 2 B2.6 Compensation measures for FFC SPA: Overview \(APP-183\)](#)). The Applicant therefore has a high degree of confidence of the feasibility of this compensation measure.

3 Next Steps

- 3.1.1.1 The Applicant will continue to refine the site selection and design details for an onshore nesting structure following the submission of the Hornsea Four Application. The Kittiwake and Gannet Compensation Plan ([B2.7 FFC SPA: Kittiwake and Gannet Compensation Plan \(APP-186\)](#)) and Roadmap included in the Application will continue to be updated based on stakeholder feedback and new relevant evidence prior to the close of Examination (noting that a separate version will be produced for gannet alone (FFC SPA: Gannet Compensation Plan) which will be submitted at Deadline 5). The Applicant is continuing to closely follow the approach taken by other projects exploring onshore artificial nesting structures. Stakeholder engagement following application through the examination period will include:

- **Statutory Nature Conservation Bodies:** Continuing regular meetings with relevant statutory nature conservation bodies, including Natural England, for feedback and input on the site selection and design of an onshore structure.
- **Landowners:** The Applicant will pursue discussions with landowners of suitable locations within the zones identified in the application. The Applicant is able to draw on knowledge gained from Hornsea Project Three who have been successful in purchasing land for the purpose of artificial nesting structures.
- **Site-specific consultation:** Once a location is known, the Applicant will consult on the designs for the nesting structure. Site-specific designs will then be developed taking consultation feedback into account. The Applicant will seek pre-application advice from the relevant Local Planning Authority. Once again, the Applicant is able to draw upon considerable knowledge gained from Hornsea Project Three who have agreed design principles, monitoring and adaptive management plans with the project's Offshore Ornithology Engagement Group (OOEG)..

4 Indicative timescale for delivery and implementation

4.1.1.1 The high-level programme presented below ([Table 1](#)) is applicable to the implementation and delivery of onshore artificial nesting compensation measure. The timing of implementation of the artificial nesting structure is provisional as the timeframe for Examination, consent award, reaching final investment decision (FID) and Contracts for Difference Allocation Round Five or Six, have not yet been set. The programme has been carefully considered to ensure timely delivery of the compensation measure. Therefore, the Applicant, through consultation with stakeholders, has committed to the implementation of a single artificial nesting structure (preferably a repurposed offshore structure) three kittiwake breeding seasons before operation.

Table 1 Indicative timescale for delivery and implementation.

Activity	Year	2021	2022	2023	2024	2025	2026	2027	2028
Site Selection	2021 – 2022								
Refinement to short listed sites	2022								
Land option agreements sought with landowners	2022								
Concept design of artificial structure	2022								
Planning Permission/ Licences Application Submission	2023								
Anticipated Hornsea Four DCO Granted	2023								
Onshore nesting consent and licencing award	2023								
Detailed design of artificial structure	2023								
Fabrication of artificial structure	2023								
Transport, Installation & Commissioning	2023								

Activity	Year	2021	2022	2023	2024	2025	2026	2027	2028
Compensation Implementation ¹	2023/ 2024 - TBC								
Onshore Construction	2024								
Establishment of Offshore Ornithology Engagement Group (OOEG)	Following consent award								
Kittiwake Compensation Implementation and Monitoring Plan (KIMP)	Following consent award								
KIMP submitted to Secretary of State	Following consent award								
Offshore Construction of Hornsea Four Foundations	Q4 2026								
Offshore Construction of Hornsea Four Offshore Turbines	Q1 2027								
First Power (partially operational windfarm)	Q1 2028								

4.1.1.2 The Wind Farm is expected to operate for 35 years following construction. If required, the accepted compensation measure(s) would be monitored throughout the operational lifespan of the Wind Farm.

5 Consultation

5.1.1.1 Post-consent a steering group abbreviated the OOEG would be convened by the Applicant to consult on the implementation, reporting and any necessary adaptive management of the structure as determined by the Applicant. The OOEG core members would be the relevant SNCB(s) and the MMO. The RSPB would also be invited to form part of the OOEG as advisory members (and potentially others as determined by the Applicant). Discussions with the OOEG will inform development of the Kittiwake Compensation Implementation and Monitoring Plan (KIMP).

5.1.1.2 The KIMP will be produced (following the content in the outline Gannet and Kittiwake Compensation Implementation and Monitoring Plan (GKIMP) **(B2.7.6 Outline Gannet and Kittiwake Compensation Implementation and Monitoring Plan (APP-192))**) noting that separate versions will be produced for gannet alone (Gannet Compensation Implementation and Monitoring Plan Bycatch and Gannet Compensation Implementation and Monitoring Plan Artificial Nesting Structure) which will be submitted at Deadline 5, which will result in the removal of gannet from certain kittiwake documents. The KIMP will document all the proposed compensation measures for kittiwake (including mechanisms and programme for delivery, monitoring, adaptive management and reporting). The OOEG will be consulted during development of the KIMP. The KIMP will be submitted to the Secretary of State for approval following consent award.

5.1.1.3 The Applicant will identify and define a practical, high-quality artificial nesting structure to support the required number of nesting birds. This would be discussed with the OOEG.

5.1.1.4 The Applicant will identify a location or locations in the UK where an artificial structure to

¹ Due to the uncertainty regarding Allocation Round 5 and 6 of the Contracts for Difference (CFD) scheme the date cannot be confirmed at this time.

provide additional breeding opportunities to kittiwake can be established. This may be a new location or a re-purposed site. This will be determined by the on-going site identification process outlined within the Evidence Report (**B2.7.4 Compensation measures for FFC SPA: Onshore Artificial Nesting: Ecological Evidence (APP-189)**), this would be discussed with the OOEG.

- 5.1.1.5 Following design and location decisions, the project will move into the implementation phase. This will involve extensive consultation with stakeholders via the OOEG process to ensure cooperation across the monitoring aspects of the compensation measure. The proposed implementation process of the measure will be documented in the KIMP and will be submitted to the Secretary of State (and other appropriate stakeholders) for approval.
- 5.1.1.6 The implementation of the compensation measures (see Section 3.2 of **B2.7 FFC SPA: Kittiwake and Gannet Compensation Plan (APP-186)**) will be monitored to report on how the measure will be discussed with the OOEG and will be set out within the KIMP for approval by the Secretary of State (and other relevant stakeholders, as necessary).
- 5.1.1.7 Monitoring will inform any adaptive management of the compensation measure, if required. The Applicant will focus on maximising effectiveness through good initial design and appropriate maintenance. This will be continued until Hornsea Four has ceased operating and therefore no further collision mortality or a determination is made by the Secretary of State following consultation with the relevant statutory nature conservation body, that compensation is no longer required.
- 5.1.1.8 Reporting of the results of implementation of the compensation measure will be carried out according to timescales discussed with the OOEG and set out in the KIMP. It is expected that annual reporting will be undertaken to monitor breeding success.

6 Site selection, design, and construction

6.1 Site selection

- 6.1.1.1 Site selection and the consideration of alternatives for onshore artificial nesting structure location, identifying the ecological, land acquisition and technical constraints and requirements, will be further developed and information submitted with the DCO application. The Applicant is working strategically to develop the onshore site selection and has been exploring the analysis undertaken for Hornsea Project Three to build upon the extensive site selection work and experience to consider potential opportunities for Hornsea Four. The Caton Bay to Newbiggin by the Sea search area is being further considered for Hornsea Four, in addition to East Suffolk, to establish specific sites on which an artificial nesting structure will be developed. Future work, such as progression of land agreements, has also been identified as being required.
- 6.1.1.2 The constraints and requirements established as a part of the site selection process have been led by the evidence-based approach, which are described in the Ecological Evidence reports (**B2.7.1 Compensation measures for FFC SPA: Offshore Artificial Nesting: Ecological Evidence (APP-187)**, **B2.7.3 Compensation measures for FFC SPA: Onshore Artificial Nesting: Ecological Evidence (APP-189)**). Initial consultation has been carried out and no significant obstacles to development have been identified.

6.1.1.3 A full account of the ecological criteria for the site selection process undertaken to date is provided in [B2.7.5 Compensation measures for FFC SPA: Artificial Nesting: Site Selection and Design \(APP-191\)](#) and an update on the site selection process is provided in the Applicant's submission to Deadline 1 at [G1.50 Compensation measures for FFC SPA: Derogation and Compensation Update Position Statement](#). The purpose of site selection has been to identify an area to host onshore an artificial nesting structure that will be occupied by new recruits in the English southern North Sea, whilst contributing to an increase of breeding adults to the biogeographic population. The preferred zone for installing onshore artificial nesting sites is located within the onshore to nearshore environment and the principles influencing this initial site selection work comprise:

- Locations which kittiwake will with certainty be able to find (for example either locations where there are existing (smaller) populations of kittiwake, or where there are factors which attract kittiwake);
- Locations where there is evidence of stable/increasing productivity and evidence of an expanding population (as a proxy for favourable prey resource);
- Locations where there is a lack of existing natural or man-made suitable nesting habitat (locations where kittiwake are attempting to nest in unfavourable conditions such as ground nesting); and
- Waterfront location away from urban housing which minimise human interaction and where purpose built onshore artificial nests can ideally overhang water, to mimic the natural nesting conditions of the target species as far as possible.

6.1.1.4 Following the submission of the DCO Application, the Applicant has continued to refine the site selection for an onshore nesting structure. Further site selection and engagement with landowners and stakeholders is currently being progressed within areas that have been shortlisted as most suitable by the Applicant, with a view to final site selection in 2022. In December 2021 the Applicant contacted a number of landowners to see if they would be interested in land purchase by the Applicant for the construction of an artificial nesting structure. Expressions of interest were received from a number of landowners and the Applicant is now planning site visits to the areas in question to undertake photographing and mapping of factors such as availability of nest space in the area and the proximity of the potential land options to neighbouring nesting birds.

6.2 Design

6.2.1.1 The design principles for an onshore artificial nesting structure are subject to significant further development; however, design principles of direct relevance to the size or appearance of the structure are as follows:

6.2.2 Kittiwake

- Steep sided with a near vertical back wall and narrow horizontal ledges;
- Located close to water, facing out to sea (i.e. nest adjacent to/above harbour waters/sea);
- Inaccessible to predators (additional anti-predation features may be required at some sites – e.g. fences/ barriers to deter mammalian predators (e.g. foxes and rats) and dependent on design bird spikes may be required as avian predator deterrents);

- Nesting ledges located above the level of highest astronomical tide and beyond the reach of wave or tidal action;
- Adequate ledge dimensions: Horizontal ledges 20 cm width; length per pair from 30 cm (working length 40 cm); and height between ledges at a minimum of 40 cm and maximum of 60cm. (Note these may be subject to change based on feedback from the stakeholders during detailed design);
- Minimum height at which the lowest shelves should begin depends on whether the structure is located directly over water or set back slightly, as well as the level of human disturbance anticipated;
- Overhang/roof to buffer against weather conditions as to act as an additional predator deterrents;
- Vertical wall leaning slightly forward (working angle of 5°; to minimise lower ledges becoming fouled by droppings and reduce predation risk);
- Using materials which are in-keeping with the structure's surroundings whilst ensuring they meet the requirements of kittiwake's natural habitat as much as possible; and
- Higher ledges could be wider than lower ledges (to prevent lower ledges becoming fouled by droppings) (BTO Field Guide No. 23, du Feu (2015)). However, wider upper ledges may increase predation risk/ allow non target species to nest.

6.2.2.1 Further design and engineering assessment works are required to determine the exact location and technical design criteria for any onshore artificial nesting structure, but for the purpose of the Application, the above is assumed.

6.2.2.2 It is anticipated that the structure will be located either at a waterfront location, or at a set-back location, dependant on land availability. The structure may be a permanent building, allowing for internal access for monitoring, or may be a prefabricated structure without internal access. An allowance for both has been included within the project description as the appearance and construction methodology would differ considerably. The maximum design parameters for a new onshore nesting foundation and platform are presented in [A4.6.1 Volume A4 Annex 6.1 Compensation Project Description \(APP-057\)](#). For kittiwake, each pair will require a ledge of up to 20cmx40cmx60cm (width, length, height). The distribution of these ledges can be tailored to a taller structure (by stacking more ledges on top of each other), or a longer structure (by providing more ledges on each row). This is based on ecological requirements in addition to the surrounding landscape and available land.

6.2.2.3 The shape of each structure is dependent on the detailed design stage and the surrounding landscape – the shape may be triangular, rectangular, hexagonal, etc.

6.3 Construction and operation

6.3.1.1 The construction of the onshore artificial nesting structure will depend on whether the structure comprises a building, or prefabricated structure (dependant on monitoring and access requirements for tagging).

6.3.1.2 Building construction works, are anticipated to comprise:

- Site preparation works, including vegetation clearance (if required), erection of site fencing and small-scale enabling works;

- Establishment of a site compound and temporary site infrastructure, including a site cabin and welfare facilities;
- Delivery of construction materials and equipment;
- Installation of necessary foundations (to be confirmed, dependant on detailed design and site location, may require piling); and
- Construction of the nesting structure on-site, methodology of which is dependent on the materials to be used (to be agreed as part of detailed design). Materials used for the building may comprise concrete, wood, or metal).

6.3.1.3 Prefabricated structure construction works are anticipated to comprise:

- Site preparation works, including vegetation clearance (if required), erection of site fencing and small-scale enabling works;
- Establishment of a site compound and temporary site infrastructure, including a site cabin and welfare facilities;
- Delivery of prefabricated components of the nesting structure and equipment;
- Installation of necessary foundations (to be confirmed, dependant on detailed design and site location, may require piling); and
- Assembly and Installation of the nesting structure on-site, methodology of which is dependent on the materials to be used (to be agreed as part of detailed design). Materials used for the prefabricated structure may comprise wood or metal.

6.3.1.4 Monitoring and maintenance activities during operation could comprise the following:

- Removal of kittiwake guano from structure (to permit safe access rather than removal from nesting ledges) and appropriate disposal;
- Remedial works to structure (i.e. storm damage to nesting ledges);
- Ensuring structure is structurally sound;
- Changing batteries used for speakers playing kittiwake calls; and
- Removal of litter, graffiti or any objects deemed hazardous to kittiwakes.

7 Monitoring and Adaptive Management

7.1.1.1 Monitoring forms an integral component of the compensatory measure and will be discussed with relevant stakeholders through the OOEG. The success in deployment of the kittiwake artificial nest structure will be monitored through observations of the number of breeding birds and their breeding success. Monitoring of these rates will follow the standard methods provided by Walsh *et al.*, (1995) and specified by the Joint Nature Conservation Committee's (JNCC) Seabird Monitoring Programme which acts as the hub of seabird population information. All relevant monitoring data collected during the project will be contributed to the JNCC's Seabird Monitoring Programme. Collection of seabird data in this format will permit comparisons to be made with on-going monitoring at existing colonies along the east coast of England, including that undertaken by the RSPB at the FFC SPA (Babcock *et al.*, 2018). In order to monitor the number of breeding birds and their breeding success whole colony counts and productivity monitoring will be conducted at the artificial nest site.

7.1.1.2 Monitoring will first be undertaken at existing kittiwake colonies adjacent to the proposed artificial nesting structure location to provide context for the performance of the artificial nests once they have been constructed. Post construction, monitoring of the artificial

nesting structure will be conducted to record both breeding birds and breeding success of the first breeding season and will continue for the lifetime of the offshore wind farm project (while also informing adaptive management and maintenance). The precise nature of monitoring at the structure will be influenced by the final form and location the compensation measure takes, but the intention is to predominantly carry out remote monitoring using cameras on the structure. It is noted within the relevant Evidence Reports, that the exact methods required may differ between an onshore and offshore request structure, but the design of the structure will seek to incorporate monitoring whilst minimising disturbance. The frequency, duration and nature of the monitoring will be discussed with OOEG members following the Applicant's decision on the refined areas of search for the structure. Monitoring will also be undertaken at adjacent existing colonies to determine whether population trends at the artificial nest structure are colony or site specific. The details of the monitoring will be set out within the KIMP for approval by the Secretary of State.

- 7.1.1.3 Monitoring of the artificial nesting structure will inform the adaptive management programme and influence any potential maintenance work required on the structure. With reference to adaptive management, monitoring of breeding pairs and breeding success each breeding season will likely determine the employment of adaptive management the following season. However, the point of intervention, when adaptive management should be incorporated, will be an area led by the Applicant and explored with the OOEG members.
- 7.1.1.4 In addition to the monitoring of compensation effectiveness outlined above, the deployment of an artificial nesting structure (either new or repurposed) for kittiwake presents an opportunity for research. Furthermore, providing access to birds and their nests through structure design can facilitate further research opportunities, and projects to increase understanding of adult survival. Such research could help deliver some of the research opportunities identified by stakeholders through the Offshore Wind Strategic Monitoring and Research Forum (OWSMRF) (Ruffino *et al.*, 2020). Such opportunities could include the following:
- RO3.1c - Undertake targeted empirical data collection as informed by the sensitivity analyses (RO3.1b);
 - RO3.3c - Deploying strategic adult kittiwake mark-recapture at multiple colonies, and analyses of re-sighting data (Re-trapping Adults for Survival (RAS) studies);
 - RO3.3d - Deploying strategic chick mark-recapture at multiple colonies, and analyses of re-sighting data; and
 - RO3.9b - Regional comparison of kittiwake diets during the breeding season: field studies.
- 7.1.1.5 Hornsea Project Three has already committed to delivering some of the OWSMRF research in relation to kittiwake diet and Hornsea Four could build on and complement this work. It is also important to note the Hornsea Four Outline Ornithological Monitoring Plan report (**F2.19: Outline Ornithological Monitoring Plan (APP-254)**) which outlines the proposed approach and objectives of any ornithological monitoring required by the Deemed Marine Licences (DMLs) prior to the granting of development consent. The report considers both kittiwake along with other seabird species (including guillemot and razorbill).
- 7.1.1.6 As stated above, the monitoring taken forward will be consulted on with the OOEG and

detailed in the KIMP that will be submitted for approval prior to the commencement of the authorised project.

7.2 Adaptive Management

- 7.2.1.1 Adaptive management is an iterative, post-consent process which combines management measures and subsequent monitoring with the aim of improving effectiveness whilst also updating knowledge and improving decision making over time. Adaptive management will be an important component of the compensation measure and will address unforeseen issues or deviations from expected time scales (i.e., colonisation rate of structure). Any adaptive measures will be thoroughly discussed and explored with relevant stakeholders as part of the OOEG prior to the implementation of any option. Further detail on each adaptive management option is presented in Evidence Report ([B2.7.1 Compensation measures for FFC SPA: Offshore Artificial Nesting: Ecological Evidence \(APP-186\)](#), [B2.7.3 Compensation measures for FFC SPA: Onshore Artificial Nesting: Ecological Evidence \(APP-189\)](#)). All known issues and risks will be mitigated through good design of the structure and routine maintenance.
- 7.2.1.2 Multiple adaptive management measures will be explored prior to the construction of the artificial nesting structure as it is important to consider the differences between intelligent structure design (which is covered in a separate section) and maintenance activity², and adaptive management. The site selection process gives weight on locations where productivity for kittiwake in relation to prey availability is favourable and the population is expanding to give confidence that this would not be an issue in the short to medium term.
- 7.2.1.3 For kittiwake acknowledging that there is natural large inter-annual variability in prey resource (forage fish recruitment), there may be short term (1-2 years) opportunities (if required) to enhance the availability of prey at or adjacent to the structure in the breeding season. This is discussed in more detail in the Evidence Reports ([B2.7.1 Compensation measures for FFC SPA: Offshore Artificial Nesting: Ecological Evidence \(APP-186\)](#), [B2.7.3 Compensation measures for FFC SPA: Onshore Artificial Nesting: Ecological Evidence \(APP-189\)](#)) and within the Supporting Evidence for Seabird Prey Resource report ([B2.6.2 Compensation Measures for FFC SPA: Prey Resource Evidence \(APP-185\)](#)) exact methods will be discussed with the OOEG. In the mid to long term, the results of the initial diet studies together with fisheries data (Inshore Fisheries and Conservation Authorities (IFCA), International Council for the Exploration of the Sea. (ICES), etc.) could be used to inform temporary measures to increase productivity at the structure.
- 7.2.1.4 The data collected will be shared with relevant advisors and authorities in order to inform consideration of fisheries management by UK government if required. Any long-term challenges to the effectiveness of the artificial nest structure relating to prey resource should be viewed in a North Sea context and in the context of natural variability and climate change. If the Applicant, in consultation with the OOEG, concludes that the artificial nesting structure is ineffective in delivering compensation and after all adaptive management options relating to the performance of the structure have been exhausted, the Applicant will consult with the OOEG with the aim of identifying alternative long-term compensation

² It is worth noting at this stage that ad-hoc maintenance, not linked to adaptive management, to the structure will also be highlighted by the monitoring plan. This will allow any remedial works or repairs to be conducted during the non-breeding season when breeding birds are not present at the structure (further information is provided in the relevant Evidence Report).

measures that are securable, deliverable and proportionate to the impact on the kittiwake at FFC SPA. In such circumstances, the Applicant will update the KIMP and will carry out the updated Plan as approved. Adaptive management measures are designed to support the compensation measure once functioning (post construction) as a way of furthering the success and supporting resilience of the measure (Evidence Reports ([B2.7.1 Compensation measures for FFC SPA: Offshore Artificial Nesting: Ecological Evidence \(APP-186\)](#)), [B2.7.3 Compensation measures for FFC SPA: Onshore Artificial Nesting: Ecological Evidence \(APP-189\)](#)). As mentioned above, adaptive management will be linked closely to the monitoring plan, the full detail of which will be agreed through the OOEG and set out within the KIMP.

8 Decommissioning

8.1.1.1 The requirement for, and the exact nature of decommissioning the onshore nesting structure, will be determined in consultation with the relevant authorities towards the end of the 35-year operational life of Hornsea Four.

8.1.1.2 For an onshore nesting structure, the Applicant will design the structure for a design life equal to that of the windfarm (i.e. 35 years plus 3 years to establish the compensation measures, pre-wind farm operation. Therefore, the lifetime of the structure is approximately 38 years). In the final few years of wind farm operation, the Applicant will commence inspections and surveys of the bird nesting structure to determine if an extension of the lifetime is possible.

9 Securing key consents and legal agreements

9.1 Legal agreement(s)

9.1.1.1 The Applicants primary approach is to secure voluntary agreements with landowners to purchase a freehold title or long leasehold interest for the land required for the artificial nesting site, together with associated rights. It is the Applicants intention to enter into multiple option agreements, if considered appropriate in order to ensure maximum flexibility in determining the final site. The Applicant is well positioned to build upon the initial work undertaken by Hornsea Project Three in this regard and will collaborate with Hornsea Project Three where appropriate to do so. If the Applicant fails to secure land rights by way of voluntary agreement, then compulsory acquisition powers are available as outlined in the Compulsory Purchase section below.

9.1.1.2 Generally the Applicant will be seeking:

- An initial option agreement that grants the Applicant exclusivity over a specified area of land for a set period with the ability to call on the land transaction to permit the installation and maintenance of the artificial nesting structures;
- Either the freehold purchase of land and/or grant of a long leasehold interest;
- Rights of access and to install service media to permit initial construction and ongoing maintenance, repair and monitoring of each structure;
- Restrictive covenants to protect the bird population on each structure, including restrictions on development and disturbance on the adjoining land, and
- Collaboration with landowners and occupiers in respect of predator deterrents/control measures on each artificial nesting site and adjoining land.

- 9.1.1.3 The Applicant will secure a term or option duration that secures the land for the operational lifetime of the offshore wind farm and will seek to secure the maximum flexibility to deliver the sites in a timely manner and for the duration required for the conditions of the DCO.

9.2 Compulsory Purchase

- 9.2.1.1 The Applicant has obtained legal advice confirming that, if necessary, compulsory acquisition powers can be obtained for the acquisition of sites based in England and Wales. In order to be successful in applying for these powers, the Applicant will need to satisfy the compulsory acquisition tests i.e. there must be a compelling case in the public interest and the rights sought must be necessary and proportionate. It will also be necessary to demonstrate the alternatives to compulsory acquisition has been considered and reasonable attempts to secure the necessary land rights by way of voluntary agreement have been exhausted.

- 9.2.1.2 The Applicant holds a Generation License pursuant to section 6 of the Electricity Act 1989 (the "1989 Act") and can therefore promote a compulsory purchase order under the 1989 Act. If that were pursued it would be necessary to demonstrate that the delivery of compensatory measures is a purpose connected with activities related to electricity generation. This is the case as the delivery of the compensation measure will be required by the DCO as a compensation measure for the impact of Hornsea Four on the FFC SPA.

10 Securing key consents

- 10.1.1.1 In parallel with securing the requisite land rights the Applicant will assess what site specific consents are needed. The Applicant will confirm whether it is necessary to submit a planning application for the carrying out of development (under Section 57(1) of the 1990 Act). If an environmental statement is required, then the time period for granting permission is sixteen weeks. The Applicant will engage with the LPA(s) using their pre-application advisory service before finalising a location to assess the likelihood of success of a proposed application in light of local planning policy. The Applicant's preliminary view is that although the development will be screened, it is likely that an environmental statement will not be required. If that is the case, the time period for granting any requisite permission would be eight weeks. It is acknowledged that additional consents may also be required, such as listed building consent if the intention is to build or adapt an existing structure in the vicinity of a listed building.

- 10.1.1.2 If any of the sites identified are coastal locations such that there are overlapping regulatory authorities, the Applicant will engage with both the Marine Management Organisation and the relevant Local Planning Authority pursuant to the Coastal Concordat (November 2013). This will determine whether a Marine Licence application is also required. The Applicant will then follow the process as outlined in the [B2.7.1 Compensation measures for FFC SPA: Offshore Artificial Nesting: Roadmap \(APP-188\)](#).

- 10.1.1.3 The relevant consents will address any proposed decommissioning requirements, specifically the requirement to submit a decommissioning plan upon cessation of generation of the windfarm. The Applicant will work with the local planning authority to ensure the conditions in the planning permits are consistent with the ongoing requirements under the DCO. The outline programme identified that the consenting process could be realistically

completed within a timeframe that enables the measure to be implemented and starting to host breeding kittiwake sufficiently in advance of the impact occurring.

11 Draft DCO wording

Schedule []

Ornithology Compensation Measures

PART 1

COMPENSATION TO PROTECT THE COHERENCE OF THE NATIONAL³ SITE NETWORK

PART 1

KITTIWAKE COMPENSATION

1. In this Schedule—

“The FFC” means the site designated as the Flamborough and Filey Coast Special protection Area;

“KCIMP” means the kittiwake compensation implementation and monitoring plan for the delivery of measures to compensate for the predicted loss of adult kittiwakes from the FFC as a result of the authorised development;

“the kittiwake compensation plan” means the document certified as the kittiwake compensation plan by the Secretary of State for the purposes of this Order under article 38 (certification of plans and documents, etc.);

“the Hornsea Four Offshore Ornithology Engagement Group” or “H4 OOEG” means the group that will assist, through consultation, the undertaker in the delivery of the compensation measures identified in the kittiwake compensation plan;

“the offshore compensation measure” means the offshore nesting structure; and

“the onshore compensation measure” means the onshore nesting structure.

Work Nos. 1, 2, 3, 4 and 5 together with any associated development offshore may not be commenced until a plan for the work of the H4 OOEG has been submitted to and approved by the Secretary of State, such plan to include—

terms of reference of the H4 OOEG;

details of the membership of the H4 OOEG which must include—

the MMO and the relevant statutory nature conservation body as core members for the offshore compensation measure;

the relevant local planning authority and statutory nature conservation body as core members for the onshore compensation measure;

the RSPB and The Wildlife Trust as advisory members, for both the onshore compensation measures and/or the offshore compensation measures subject to their area of expertise;

details of the proposed schedule of meetings, timetable for preparation of the KCIMP and reporting and review periods;

the dispute resolution mechanism and confidentiality provisions; and

the scope of work to be limited to the topics for discussion as identified by the appointed chair to include in relation to the compensation measure, monitoring and adaptive management.

Following consultation with the H4 OOEG, the KCIMP must be submitted to the Secretary of State for approval in consultation with the MMO and relevant statutory nature conservation body for the offshore compensation measure (if required), and with the relevant local planning authority and relevant statutory

³ This wording reflects the wording in the draft DCO submitted at DL1.

nature conservation body for the onshore compensation measures (if required). The KCIMP must be based on the strategy for kittiwake compensation set out in the kittiwake compensation plan and include—

- details of locations where compensation measures will be delivered, and in the event an onshore structure is required, details of landowner agreement(s) and in the event an offshore structure is required, details of any relevant seabed agreement(s);
- details of the design of the artificial nesting structure; including the projected number of nests that will be accommodated on the structure, and how risks from avian or mammalian predation and for an onshore nesting structure how unauthorised human access will be mitigated;
- an implementation timetable for delivery of the artificial nesting structure, such timetable to ensure that the structure is in place to allow for three full kittiwake breeding seasons prior to operation of any turbine forming part of the authorised development. For the purposes of this paragraph each breeding season is assumed to have commenced on 1st April in each year and ended on 31st August;
- details of the maintenance schedule for the artificial nesting structure;
- details for the proposed ongoing monitoring of the measures including—
 - survey methods;
 - survey programmes; and
 - colony and productivity counts;
- recording of H4 OOEG consultations;
- details of any adaptive management measures, with details of the factors used to trigger any such measures; and
- provision for reporting to the Secretary of State, to include details of the use of the structure by breeding kittiwake to identify barriers to success and target any adaptive management measures.

The undertaker must construct the artificial nest structure as set out in the KCIMP approved by the Secretary of State.

The undertaker must notify the Secretary of State of completion of construction of the artificial nest structure as set out in the KCIMP.

The artificial nest structure must not be decommissioned without prior written approval of the Secretary of State in consultation with relevant statutory nature conservation body.

The KCIMP approved under this Schedule includes any amendments that may subsequently be approved in writing by the Secretary of State. Any amendments to or variations of the approved KCIMP must be in accordance with the principles set out in the kittiwake compensation plan and may only be approved where it has been demonstrated to the satisfaction of the Secretary of State that it is unlikely to give rise to any materially new or materially different environmental effects from those considered in the kittiwake compensation plan.

[PART 3⁴

Gannet Guillemot and Razorbill Compensation Measures

1. The GGRIMP must be submitted to the Secretary of State for approval in consultation with the MMO and the relevant statutory nature conservation body for offshore compensation measures, and with the relevant statutory nature conservation body and the relevant local planning authority and relevant conservation trusts for onshore compensation measures. The GGRIMP must be based on the strategy for gannet, guillemot and razorbill compensation set out in the gannet guillemot and razorbill compensation plan and include:

⁴ The proposed DCO wording shall be updated for DL2 together with the relevant definitions and terms applicable to Gannet, Razorbill and Guillemot Compensation Measures under Part 1.

- a) in the event that the undertaker must implement predator eradication and/or predator control measures
 - i. details of locations where compensation measures will be deployed;
 - ii. details of how any necessary access rights, licences and approvals have or will be obtained and any biosecurity measures will or have been secured;
 - iii. an implementation timetable for delivery of the predator eradication and/or predator control measure that ensures that the measure has been implemented two years prior to operation of any turbine forming part of the authorised development;
 - iv. proposals for monitoring and reporting on the effectiveness of the measures, including productivity rates; breeding population and distribution of breeding birds;
 - v. recording of H4 OoEG consultations;
 - vi. details of any adaptive management measures, with details of the factors used to trigger any such measures; and
 - vii. provision for reporting to the Secretary of State, to include details of the use of each site by breeding guillemot and razorbill to identify barriers to success and target the adaptive management measures.
 - b) in the event that the undertaker must implement bycatch reduction measures
 - i. details of relevant technology supply agreements and arrangements with fishers to uptake the bycatch reduction technology that will or has been secured;
 - ii. an implementation timetable for provision of the bycatch reduction measures that ensures that the measures are in place prior to the operation of any turbine forming part of the authorised development;
 - iii. proposals for monitoring and reporting on the effectiveness of the measures, including the collection of data from participating fishers;
 - iv. recording of H4 OoEG consultations;
 - v. details of any adaptive management measures and details of the factors used to trigger adaptive management measures for each species; and
 - vi. provision for annual reporting to the Secretary of State, to identify barriers to success and target the adaptive management measures.
2. The undertaker must implement the compensation measures as set out in the GGRIMP approved by the Secretary of State.
 3. The undertaker must notify the Secretary of State of completion of implementation of the measures set out in the GGRIMP.
 4. The GGRIMP approved under this Schedule includes any amendments that may subsequently be approved in writing by the Secretary of State. Any amendments to or variations of the approved GGRIMP must be in accordance with the principles set out in the gannet, guillemot and razorbill compensation plan and may only be approved where it has been demonstrated to the satisfaction of the Secretary of State that it is unlikely to give rise to any materially new or materially different environmental effects from those considered in the kittiwake compensation plan.

PART 4

Fish Habitat Enhancement

5. No turbine forming part of the authorised development may begin operation until the fish habitat enhancement measures have been implemented in accordance with the principles as set out in the GKIMP and the GGRIMP (as relevant).]

12 Funding

12.1.1.1 The Applicant has identified the costs associated with the development, construction, operation and decommissioning of the proposed compensation measure. These costs have been included within a detailed Funding Statement ([B2.10 RP Volume B2 Chapter 10 Without Prejudice Derogation Funding Statement \(APP-202\)](#)). This statement is supplemental to the Funding Statement submitted as part of the suite of Application documents. The Funding Statement(s) outline the overall project cost based on the capital expenditure and operational expenditure assumptions in the "Review of Renewable Electricity Generation Cost and Technical Assumptions" (DECC 2016). The Funding Statement(s) also detail the corporate structure and a robust explanation to allow the SoS to conclude that the necessary funding to deliver the compensation measure can be secured.

13 Conclusion

13.1.1.1 The Applicant is confident that the compensation measure is viable, will be effective and can be delivered. The Applicant will continue stakeholder engagement to demonstrate the suitability of the refined site selection and design and ensure the compensation measure can be readily achieved and secured.

14 References

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