

Hornsea Three

Kittiwake Implementation and Monitoring Plan (KIMP)

 Orsted

Document Control

Document Properties	
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Title	Kittiwake Implementation and Monitoring Plan (KIMP)

Version History

Date	Version	Status	Description / Changes
04/08/2021	1	Draft	1 st iteration for OOEG review
15/09/2021	2	Draft	2 nd iteration for OOEG review: updates to incorporate stakeholder comments following 1 st OOEG review.
27/10/2021	3	Draft	3 rd iteration for OOEG review: updates to incorporate stakeholder comments following 2 nd OOEG review.
01/12/2021	4	Draft	4 th iteration for OOEG and Local Planning Authority review.
21/11/2022	5	Draft	5 th iteration as submitted to consultees for review.
22/12/2022	6	Final	Final iteration for submission to the Secretary of State of the Department for Business Energy and Industrial Strategy.

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Appendix A: Design report

Acronyms

Acronym	Definition
AEol	Adverse Effect on Integrity
AfL	Agreement for Lease
ANS	Artificial Nesting Structures
AONs	Apparently Occupied Nests
BTO	British Trust for Ornithology
COWSC	Collaboration on Offshore Wind Strategic Compensation
DCO	Development Consent Order
Defra	Department for Environment, Fisheries and Rural Affairs
EPS	European Protected Species
FFC	Flamborough and Filey Coast
HAT	Highest Astronomical Tide
HPAI	Highly Pathogenic Avian Influenza
HRA	Habitats Regulations Assessment
IMLOTS	Isle of May long-term study
JNCC	Joint Nature Conservation Committee
KCP	Kittiwake Compensation Plan
KIMP	Kittiwake Implementation and Monitoring Plan
MERP	Marine Ecosystems Research Programme
MMO	Marine Management Organisation
NDA	Non-Disclosure Agreement
OOEG	Offshore Ornithology Engagement Group
OWIC	Offshore Wind Industry Council
OWSMRF	Offshore Wind Strategic Monitoring Research Forum
PREDICT	Predicting seasonal movement of marine top predators using fish migration routes and autonomous platforms
RAS	Retrapping Adults for Survival
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SPA	Special Protection Area
SMP	Seabird Monitoring Programme
SNCB	Statutory Nature Conservation Body
UKCEH	UK Centre for Ecology and Hydrology
UoA	University of Aberdeen

Units

Unit	Definition
ha	Hectare
km	Kilometres
m	Metre

1 Introduction

- 1.1.1.1 A Development Consent Order (DCO) was awarded to Orsted Hornsea Project Three (UK) Limited (hereafter referred to as "Orsted") on 31st December 2020 ("the DCO"). Orsted is working towards reaching a final investment decision and taking the Hornsea Project Three Offshore Wind Farm (hereafter referred to as "Hornsea Three") through the construction phase. As part of the DCO, Orsted is required to compensate for potential mortality from collision of adult kittiwake associated with the Flamborough and Filey Coast Special Protection Area (FFC SPA) with the operational turbines of Hornsea Three. The compensation that Hornsea Three is required to implement is in the form of coastal artificial nesting structures (ANS) designed to support sufficient breeding pairs of kittiwake to ensure that the potential impacts from Hornsea Three on this feature are offset.
- 1.1.1.2 This document serves as the Kittiwake Implementation and Monitoring Plan (KIMP) for Hornsea Three. It has been produced to fulfil paragraph 3 of Schedule 14: Part 1, Kittiwake Compensation Measures of the DCO that requires the undertaker to develop a KIMP based on the strategy set out in the Kittiwake Compensation Plan (KCP)¹ (certified plan pursuant to Article 36 of the DCO).
- 1.1.1.3 The document includes the following sections:
- **Section 2** presents the background to the kittiwake compensation and the DCO requirements;
 - **Section 3** summarises the consultation that has been undertaken (Para. 3(d) of Part 1 of Schedule 14 of the DCO);
 - **Section 4** sets out the scale and chosen locations of the ANS (Para. 3(a) of Part 1 of Schedule 14 of the DCO);
 - **Section 5** presents the designs of the ANS (Para. 3(b) of Part 1 of Schedule 14 of the DCO);
 - **Section 6** outlines the maintenance that will be undertaken throughout the lifetime of the ANS (Para. 3(h) of Part 1 of Schedule 14 of the DCO);
 - **Section 7** describes the planning permissions and licences that will be obtained in order to implement the ANS;
 - **Section 8** presents the plans for monitoring and adaptive management (Para. 3 (d to g) of Part 1 of Schedule 14 of the DCO);
 - **Section 9** sets out the success criteria (Para. 3(d) of Part 1 of Schedule 14 of the DCO);
 - **Section 10** outlines reporting requirements (Para. 3(d) and (f) of Part 1 of Schedule 14 of the DCO);
 - **Section 11** shows the programme for implementation and delivery (Para. 3(c) of Part 1 of Schedule 14 of the DCO);
 - **Section 12** summarises progress on Hornsea Three's prey research projects (Para. 3(i) of Part 1 of Schedule 14 of the DCO); and
 - **Section 13** concludes how the paragraphs at Part 1 Schedule 14 have been discharged.
- 1.1.1.4 This KIMP is supported by a number of accompanying documents:
- Hornsea Three KIMP Appendix A Design Report;
 - Hornsea Three KIMP Appendix A Design Report Appendix 1: Pattern Book; and
 - Hornsea Three KIMP Appendix A Design Report Appendix 2: Supporting Design Information.

¹ [Response to the Secretary of State's Minded to Approve Letter - Appendix 2: Kittiwake Compensation Plan](#)

2 Background

- 2.1.1.1 Orsted submitted a DCO application for Hornsea Three on 14th May 2018 and accompanying the application, the Habitats Regulations Assessment (HRA) Report concluded no Adverse Effect on Integrity (AEoI) for all project interactions with designated sites and their associated features alone and in combination with other plans and projects. The application was accepted by the Planning Inspectorate in June 2018. Post examination but prior to the Department for Business, Energy and Industrial Strategy (BEIS) Secretary of State's decision, Orsted was required to submit information relating to the Habitats Regulations derogation², on a without prejudice basis. This included the submission of proposals relating to compensatory measures for (and not limited to) collision impacts on the kittiwake feature of the FFC SPA. During the decision process, the Secretary of State requested further efforts were made by Orsted to identify kittiwake compensatory measures that were supported in principle by the Statutory Nature Conservation Body (SNCB), i.e. Natural England. Orsted made submissions (in September 2020) in response to this request which included proposals (still on a without prejudice basis) for the provision of coastal ANS, which were broadly supported by Natural England.
- 2.1.1.2 A number of documents were submitted by Orsted in relation to kittiwake compensation. They can be viewed on the Planning Inspectorate's website³.
- 2.1.1.3 Consent for Hornsea Three was awarded on 31st December 2020. The Secretary of State's HRA concluded that an AEoI could not be ruled out for in-combination collision mortality for kittiwake at FFC SPA (as well for other matters relating to Special Areas of Conservation, which are the subject of a separate report). As a consequence, the Secretary of State determined that Hornsea Three triggered Article 6(4) of the Habitats Directive and that Orsted must deliver compensation to offset the potential impact on the designated features.
- 2.1.1.4 In the DCO, the Secretary of State stipulated that a KIMP be produced. Schedule 14 of the DCO states that "*The KIMP must be submitted to the Secretary of State for approval (in consultation with the MMO, the local planning authority or authorities for the land containing the artificial nest sites, and Natural England)*". The DCO also states that Orsted "*must implement the measures as set out in the KIMP*" and "*no operation of any turbine forming part of the authorised development may be commenced until four full breeding seasons following the implementation of the measures set out in the KIMP have elapsed*"⁴.
- 2.1.1.5 The establishment of an Offshore Ornithology Engagement Group (OOEG) was a requirement of the DCO, with first meeting of the OOEG taking place on 17th March 2021. This document presents the kittiwake compensation measures that have been consulted on with the OOEG and local planning authorities, particularly focussing on the location and design of the ANS and associated monitoring and adaptive management plans.

² https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/EN_art_6_guide_jun_2019.pdf

³ <https://infrastructure.planninginspectorate.gov.uk/projects/eastern/hornsea-project-three-offshore-wind-farm/?ipcsection=docs&stage=6&filter1=Response+to+the+Secretary+of+State%E2%80%99s+Minded+to+Approve+Letter>

⁴ [CONFIDENTIAL & COMMERCIALY SENSITIVE]

3 Consultation

- 3.1.1.1 Orsted established the OOEG following consent award. The OOEG comprises the following core members as the named consultees within Para. 3 of Part 1 of Schedule 14 of the DCO:
- Orsted Hornsea Project Three (UK) Limited;
 - Natural England; and
 - The Marine Management Organisation (MMO).
- 3.1.1.2 In addition, the following consultee was specified in the KCP⁵ and has attended the OOEG as a core member:
- The Royal Society for the Protection of Birds (RSPB)⁶.
- 3.1.1.3 The core members provided representative(s) to attend meetings of the OOEG and otherwise participate in the business of the OOEG in accordance with the Plan of Work (approved by BEIS on 7th September 2021⁷, Document Reference 07038039_A)⁸.
- 3.1.1.4 Orsted also invited a number of specialist consultants or delivery partners (who are assisting in the delivery of the kittiwake compensation measures) to the OOEG meetings, as follows:
- Collaborative Environmental Advisers (independent chair);
 - GoBe Consultants Ltd (planning, strategic and technical advice);
 - NIRAS (ornithological specialists); and
 - LDA Design (architectural design and planning specialists).
- 3.1.1.5 To assist in the OOEG discussions, Orsted invited the following organisations to join the technical panel meetings as advisory members⁹:
- The Department for Environment, Food and Rural Affairs (DEFRA);
 - The Joint Nature Conservation Committee (JNCC); and
 - UK Centre for Ecology and Hydrology (UKCEH).
- 3.1.1.6 OOEG meetings were held on a minimum six weekly basis, and as of December 2022, there have been fifteen OOEG meetings comprising: an initial inception meeting on 17th March 2021, followed by seven further technical panel meetings (including both core and advisory members), and seven Steering Group meetings (core members only), a summary of which is provided in **Table 3-1** below. Full details of the consultation and main topics discussed are available in the Consultation Summary Report (doc. ref. 07337257_A).

⁵ The Kittiwake Compensation Plan was submitted by Orsted in their Response to the Secretary of State's Minded to Approve Letter. The Kittiwake Compensation Plan set out the proposed compensation relating to potential in-combination effects of Hornsea Three on the designated kittiwake population at the FFC SPA and describes how compensation would be delivered.

⁶ [CONFIDENTIAL]

⁷ [EN010080-003612-Hornsea Three Requirement Approval Letter - OOEG - 07 09 21.pdf \(planninginspectorate.gov.uk\)](#)

⁸ [EN010080-003614-Hornsea Three Offshore Ornithology Engagement Group Plan of Work \(07038039_A\).pdf \(planninginspectorate.gov.uk\)](#)

⁹ UKCEH, DEFRA and JNCC were involved on an invite only basis during the early OOEG meetings.

Table 3-1: Summary of OOEG Meetings.

OOEG Meeting	Date	Context
Technical Panel #1	17 March 2021	Introduction to the kittiwake compensation proposals. Discussion on Plan of Work, purpose of the OOEG and engagement programme.
Technical Panel #2	14 April 2021	Site selection, design principles and early monitoring requirements.
Technical Panel #3	26 May 2021	Site selection refinement, design options and early monitoring requirements.
Technical Panel #4	07 July 2021	Site confirmation in North East and progression of sites in East Anglia, concept designs, monitoring and adaptive management.
Steering Group #1	21 July 2021	Discussion on key points raised in OOEG to date. Focus on success criteria and monitoring limitations.
Technical Panel #5	18 August 2021	Site update, discussion of concept designs, monitoring and adaptive management discussions and discussion of first iteration of KIMP.
Steering Group #2	16 September 2021	Success Criteria Workshop – Discussion of how the success of the measure will be determined.
Technical Panel #6	29 September 2021	Site update, discussion of concept designs, monitoring and adaptive management discussions and discussion of second iteration of KIMP.
Technical Panel #7	10 November 2021	Site update, discussion of concept designs, monitoring and approach to adaptive management discussions and discussion of third iteration of KIMP.
Technical Panel #8	15 December 2021	Site update, discussion of concept designs and offshore monitoring discussion.
Steering Group #3	20 January 2022	Site update, discussion of nearshore concept designs, monitoring, approach to adaptive management and KIMP comments.
Steering Group #4	13 April 2022	Site update and discussion of concept designs.
Steering Group #5	13 June 2022	Site update, project updates on planning applications, marine licences and KIMP submission.
Steering Group #6	15 August 2022	Site update, project updates on planning applications, marine licences and KIMP submission.
Steering Group #7	03 October 2022	Site update, update on project timescales and next steps, summary of 2022 monitoring campaign and lessons to be learned.

3.1.1.7 In addition, Orsted held in-depth consultation meetings with relevant local planning authorities (Hartlepool Borough Council, Durham County Council and East Suffolk Council) which took place separately to the OOEG meetings, to allow for location-specific discussions and to take on board considerations of the local community. A summary of the consultation which has taken place with local planning authorities has been included in Table 1-2 of the Consultation Summary Report (doc. ref. 07337257_A).

3.1.1.8 Orsted have also consulted with a range of landowners and key stakeholders, for example Associated British Ports in the context of the Port of Lowestoft, as part of the site selection process. Details of the full range of consultees are provided within the Consultation Summary Report (doc. ref. 07337257_A).

4 Scale and Location of Compensation

4.1 Scale

- 4.1.1.1 Within the updated collision risk modelling¹⁰ that was submitted in February 2020, (which was based on the Secretary of State's accepted methodology) a potential impact range of 65-73 kittiwake collisions per annum was identified.
- 4.1.1.2 Within Orsted's submissions in response to the Secretary of State, it was proposed that increasing the productivity of the kittiwake population by constructing and maintaining four ANS located along the English east coast would compensate for potential collision mortalities of kittiwake resulting from the operation of Hornsea Three. The structures will provide a significant amount of potentially optimal nesting space for kittiwake in locations where existing populations have favourable productivity but are constrained by nesting space availability, based on findings from Orsted's 2021 and 2022 monitoring campaign (NIRAS, 2022). Two broad search zones were identified within these submissions (refer to Kittiwake Artificial Nest Provisioning: Site Selection and the Pathway to Securement¹¹) along the coast of East Anglia and North East of England.
- 4.1.1.3 Schedule 14 of the DCO establishes that the KIMP (and therefore, compensation measure proposals) must be developed in line with the strategy for kittiwake compensation set out in the KCP¹, certified plan pursuant to Article 36 of the DCO (as submitted by Orsted in September 2020 during the determination process). The certified plan identifies in paragraphs 1.8 to 1.9 that:

".....the Applicant will implement four artificial nesting structures designed specifically for kittiwake within search zones identified on the east coast of England (in the North East and East Anglia).

In providing four compensatory structures at a minimum of two geographically distinct zones, with each capable of delivering the upper estimate for level of compensation required (i.e., 73 breeding adults), the Applicant is ensuring that significant contingency is built into the measure to provide the necessary confidence that it will substantively offset the impact in all actual impact scenarios from the Hornsea Three wind farm.

Annex 2: Ecological Evidence has established a precautionary, yet realistic, set of assumptions on which to calculate the number of breeding pairs required to deliver a minimum of 73 breeding adults. The population calculation determined that 404-467 pairs of breeding kittiwake would be required to subsequently produce 73 breeding adult birds. Therefore, the proposed scale of the compensatory measure will be such that it can provide sufficient nesting space to support at least 404-467 breeding pairs at each of the structures taken forward (i.e., it has the potential to deliver four times the upper end of the SoS' impact estimate)."

- 4.1.1.4 The evidence relating to the scale of impact to be compensated and areas of search within which structures will be located is summarised above and in the following sections, respectively. Further information is provided within the documents submitted by Orsted in September 2020 (as cited in [Section 2.1.1.2](#) of this report) and is not repeated in detail here. Rather, this section focuses on the steps taken since consent to identify suitable locations within the areas of search for four structures of sufficient size to each support up to 467 breeding pairs of kittiwake as required by the DCO.

¹⁰ [EN010080-003194-HOW03_CON02_Appendix4 Annexes_Mitigation.EnvelopeModifications.pdf \(planninginspectorate.gov.uk\)](#)

¹¹ [Annex 3 to Appendix 2: Kittiwake Artificial Nest Provisioning Site Selection and the Pathway to Securement](#)

4.2 Site Selection

- 4.2.1.1 The site selection process initially focussed on the ecological objectives of the compensation measure. Selected locations are situated in proximity to existing kittiwake colonies, where populations are increasing, productivity is high and natural nesting spaces are limited. The selected locations therefore have a high likelihood of being colonised by kittiwake, fulfilling the ecological objectives of this KIMP (paragraph 3(a) of Part 1 of Schedule 14 of the Hornsea Three DCO). The OOEG agreed with the sites selected and their ecological merit, as summarised in the Consultation Summary Report (document reference 07337257_A).
- 4.2.1.2 Further details of the ecological merits of these locations are provided within the Site Selection Narrative Report (doc. ref. 07337541_A), which should be read alongside this KIMP (however, it is noted that aspects of this report are confidential and not available to all readers of the KIMP). Specific design principles are another step in ensuring the ecological objectives are delivered e.g. vertical elevations, narrow nesting ledges and overhangs to prevent avian and mammalian predation of kittiwake chicks. These design principles have been agreed with the OOEG and are provided within [Appendix 1: Pattern Book of Appendix A: Design Report](#).
- 4.2.1.3 It is proposed that ANS will be implemented across the locations presented in [Sections 4.2.1 to 4.2.4](#), with the exact distribution subject to consenting. Within the North East search area, up to two ANS will be constructed on land purchased at the site of the Old Hartlepool Yacht Club ([Figure 1](#)) and/or up to two ANS will be constructed within the [REDACTED] ([Figure 2](#)). Within the East Anglia search area, up to two ANS will be constructed within the 'Lowestoft ANS Search Area' ([Figure 3](#)) and/or one ANS will be constructed within the 'Minsmere ANS Search Area' ([Figure 4](#)). The onshore ANS will be based on two different typologies with a third design for the marine structures (see [Section 5](#) below for details of structure design).

North East

4.2.1 Hartlepool – Old Yacht Club (onshore)

- 4.2.1.1 It is proposed that up to two ANS will be located at the Old Hartlepool Yacht Club, Ferry Road, Hartlepool (grid reference: 452257 (Easting), 533546 (Northing)), which is illustrated in [Figure 1](#).
- 4.2.1.2 In December 2021, Orsted completed the purchase of the Old Hartlepool Yacht Club. Refer to land registry title number "CE147445" for evidence that the land has been bought. The Old Hartlepool Yacht Club lies in very close proximity (30 m) to an existing growing kittiwake colony, demonstrating its strong ecological suitability (see factors considered in site selection above in [Section 4.2.1.1](#)). During the 2022 breeding season, 177 apparently occupied nests (AON) were found at this existing colony (which occupies the walkway to the lifeboat pontoon), representing 51% of total occupied kittiwake nests in the Hartlepool Headland and port area (NIRAS, 2022).
- 4.2.1.3 The Old Hartlepool Yacht Club site comprises approximately 1 acre and is large enough to support more than one ANS. The OOEG agreed to progress with this site for the northeast region during OOEG technical panel #4 on 07/07/2021 and it was agreed as a location for two ANS in the North East during technical panel #6 on 29/09/2021. Therefore, given it is a strong site ecologically and a preferred location by the OOEG, it will be used to house up to two types of structures (see [Section 5](#) for the designs).

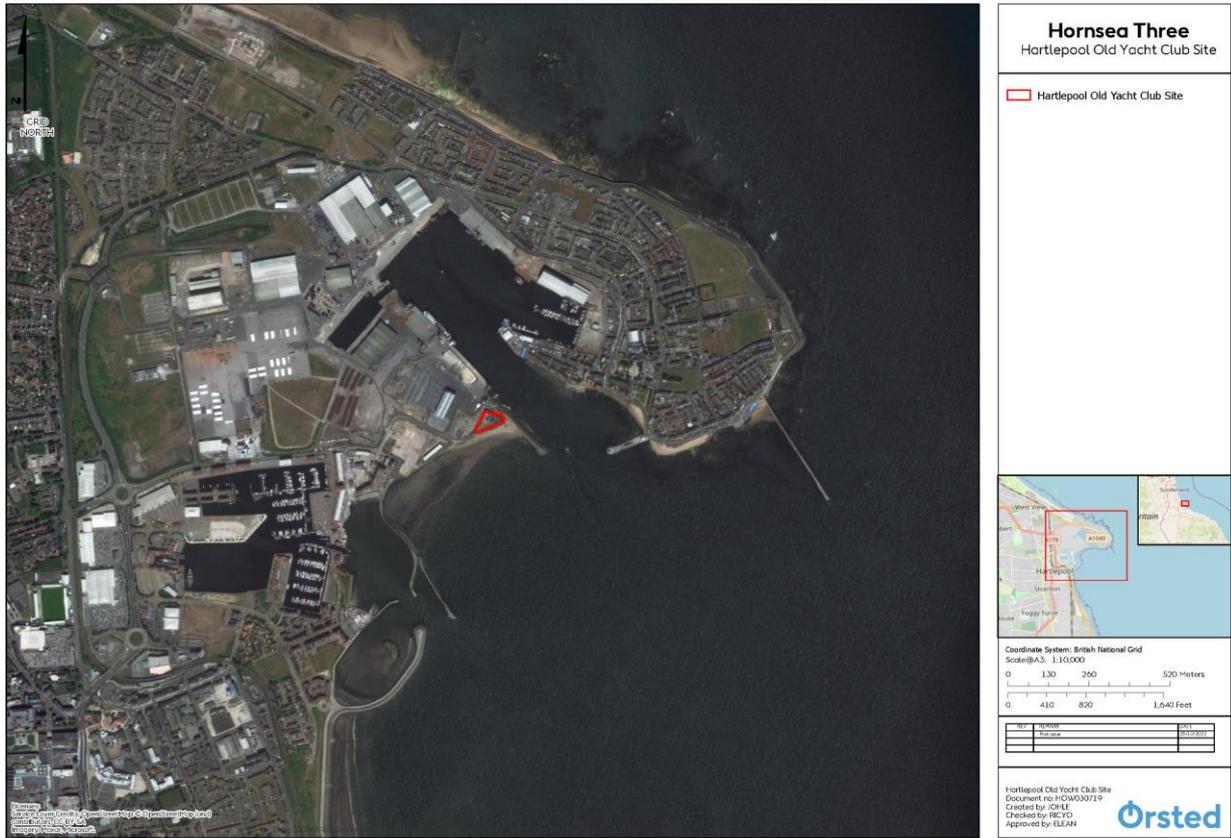


Figure 1: Location of the Old Hartlepool Yacht Club.

4.2.2 [REDACTED] - **CONFIDENTIAL & COMMERCIALY SENSITIVE**

4.2.2.1 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

4.2.2.2 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

4.2.2.3 [REDACTED]
[REDACTED]



Figure 2: [REDACTED] - **CONFIDENTIAL & COMMERCIALY SENSITIVE.**

East Anglia

4.2.3 Lowestoft (nearshore)

- 4.2.3.1 It is proposed that up to two ANS will be located in the nearshore environment within the “Lowestoft ANS Search Area”, illustrated in **Figure 3**. The dimensions of the Lowestoft ANS Search Area are 300 m x 800m with an area of 240,352 m². This polygon is located 990 m from the shoreline at its closest point and 1.4km at its furthest point. Following review of geophysical and geotechnical survey data, an area of interest has been identified within the Lowestoft ANS Search Area. This is illustrated by the red box in **Figure 3**. The area of interest is 200 m x 250 m and has an area of 50,136 m².
- 4.2.3.2 The Lowestoft ANS Search Area is a strong site ecologically due to its proximity to the existing kittiwake colonies within the town of Lowestoft (see factors considered in site selection above in **Section 4.2.1.1**), the closest being at Claremont Pier where 54 AON were recorded during the 2022 breeding season (NIRAS, 2022). It was agreed as a preferred location with the OoEG during technical panel meeting #3 on 27/05/2021 and steering group meeting #4 on 13/04/2022.
- 4.2.3.3 Orsted have an AfL in place with The Crown Estate for this location (specifically, the smaller ‘area of interest’). The AfL gives Orsted the right to exercise the option to call upon the Crown Estate to grant a Lease. Orsted submitted a report in May 2022 in response to The Crown Estate’s “Guiding Principles for Environmental Compensatory Measures for which a Seabed Lease may be requested”. This satisfied The Crown Estate that their criteria for awarding a seabed lease for the purpose of compensation had been met.



Figure 3: Location of the ‘Lowestoft ANS Search Area’.

4.2.4 Minsmere (nearshore)

- 4.2.4.1 It is proposed that one ANS will be located in the nearshore environment within the “Minsmere ANS Search Area”, illustrated in **Figure 4**. This area is located 1.43 km from the shoreline at its closest point and 1.55km at its furthest point. The dimensions of the Minsmere ANS Search Area are 100 m x 100 m with an area of 100 m².
- 4.2.4.2 This location is a strong site ecologically (see factors considered in site selection above in **Section 4.2.1.1**) due to its proximity to the existing kittiwake colonies on the inflow and outflow rigs associated with the Sizewell A power station, but it is noted that a sufficient distance has been maintained from existing assets and planned future work areas following discussions with nearby infrastructure owners. During the 2022 breeding season, an estimated 182 AON were recorded across the two rigs (NIRAS, 2022). In Technical Panels #5 (18/08/2021), #7 (10/11/2021) and #8 (15/12/2021) the OoEG favoured this location, particularly welcoming a marine structure, and agreed it is strong ecologically.
- 4.2.4.3 Orsted have an AfL in place with The Crown Estate for this location. The AfL gives Orsted the right to exercise the option to call upon the Crown Estate to grant a Lease. Orsted submitted a report in May 2022 in response to The Crown Estate’s “Guiding Principles for Environmental Compensatory Measures for which a Seabed Lease may be requested”. This satisfied The Crown Estate that their criteria for awarding a seabed lease for the purpose of compensation had been met.

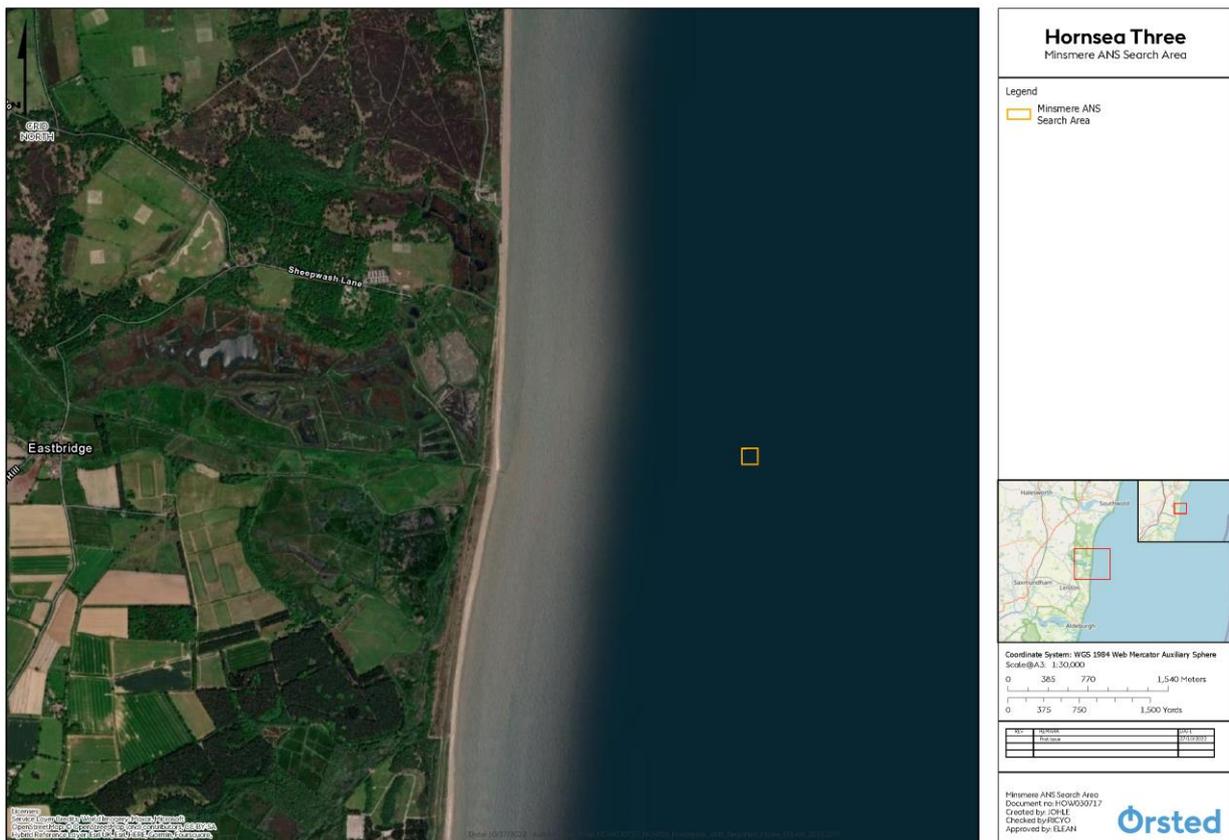


Figure 4: Location of the ‘Minsmere ANS Search Area’.

5 Design of Artificial Nesting Structures

- 5.1.1.1 Para. 3(b) of Part 1 of Schedule 14 of the DCO requires the KIMP to include “*details of designs of artificial nest sites including the number of nesting structures; and how risks from avian or mammalian predation and unauthorised human access will be mitigated*”.
- 5.1.1.2 **Appendix A: Design Report** (document reference: 07559813_A) of this KIMP provides a detailed overview of the design process, principles and proposals for the ANS including how risks from avian or mammalian predation and unauthorised human access will be mitigated. For example, using overhangs (with dimensions advised by the OOEG) and inclusion of adequate security interventions (i.e., perimeter fencing and CCTV where required).
- 5.1.1.3 The KIMP Design Report is accompanied by two appendices:
- Appendix 1 – Kittiwake artificial nesting structure pattern book;
 - Appendix 2 – Supporting design information: Nearshore and Onshore ANS Typologies, visuals and dimensions
- 5.1.1.4 Approaches to the designs and proposals for each ANS were presented and discussed during OOEG meetings. This included the presentation of graphic design concepts and live 3D models to help communicate the concepts and their 3-dimensional appearance as clearly as possible. The ANS designs evolved following written and verbal (via meeting minutes) feedback from the OOEG, including very specific advice on dimensions such as for overhangs and nesting compartments. Overall, the OOEG members agreed that the designs are ecologically suitable. Comments from key stakeholders outside of the OOEG, including Associated British Ports, the Maritime and Coastguard Agency, Trinity House and the Suffolk Coast and Heaths Area of Outstanding Natural Beauty Partnership, were also taken into account as part of the design process, for example regarding the colour scheme of the nearshore ANS.
- 5.1.1.5 All ANS are designed to accommodate a minimum of 467 nesting compartments. Full details of the final ANS design proposals for all secured sites are provided within **Appendix A: Design Report**.

6 Structure Maintenance

- 6.1.1.1 Maintenance will occur on an annual basis throughout the lifetime of the ANS and as required for urgent works. All planned maintenance activities including visual inspection and certification of all fall arrest systems and cleaning of the navigation lights will take place outside of the breeding season i.e. between early October and late February. Nests will be left in place between seasons as this identifies the structure as a colony, indicates where nesting space is available and allows new colonists to take up occupancy between established nests.
- 6.1.1.2 Maintenance which requires urgent attention (for example, a loose nesting ledge damaged by storm activity which may fall on active nests below) may need to be actioned during the kittiwake breeding season. This would not be considered as planned and therefore any ad-hoc works to the ANS required prior to the operation of Hornsea Three will be considered as structure maintenance. Structure maintenance will include actions to ensure the upkeep and function of the ANS including, but not limited to the following examples:
- Repairing storm damage to ANS; and
 - Repairing damage to perimeter fence.
- 6.1.1.3 The process for determining structure maintenance action and notification with OOEG members is presented within **Figure 8**.
- 6.1.1.4 Any structure maintenance undertaken prior to Hornsea Three operation will not delay the intended date for operation of the wind turbines for the purposes of the DCO.
- 6.1.1.5 Adaptive management will be initiated, if required, after the operation of Hornsea Three. This process is set out in further detail in **Section 8.2**.

- 6.1.1.6 Maintenance requirements of each ANS will be reviewed by Orsted on an annual basis to ensure any additional needs are addressed throughout the lifetime of the ANS. Guano will not be removed from the nesting locations but will be removed from access infrastructure (i.e., access ladders) for health and safety reasons. The removal of debris (such as plastics) will also be undertaken if a health and safety risk, or a risk to breeding kittiwake, is identified. However, it is acknowledged that some debris may be incorporated within kittiwake nests which may not pose a threat to birds or human health and safety. In such an instance, debris will be left in situ.
- 6.1.1.7 An indicative rolling 10-year maintenance schedule for the onshore ANS is provided in **Figure 5** and for the nearshore ANS in **Figure 6**. These schedules will be revised according to experience gained during the operation of the ANS. It is noted that timeframes presented in these schedules are estimates, and if more frequent maintenance is needed for matters which require urgent attention, such as repairs to a navigational light, this will take place as and when required. Further detail will be set out in the Lighting and Marking Plan and Aids to Navigation Management Plan which will require approval by Trinity House and the MMO.

Activity	Ten year rolling cycle									
	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Inspection & cleaning of ANS	█	█	█	█	█	█	█	█	█	█
Landscape maintenance e.g. irrigation, pruning and removal of weeds	█	█	█	█	█	█	█	█	█	█
Inspect and maintain lighting/CCTV and replace when necessary	█	█	█	█	█	█	█	█	█	█
Maintenance of external cladding materials*			█			█			█	

*Dependent on final materials selected

Note: Any other major or minor repairs would be conducted as and when required

Figure 5: Indicative maintenance schedule – onshore ANS.

Activity	Detail	Likely duration	Ten year rolling cycle									
			Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Annual inspection of all components (topside)	Scheduled	5 days	█	█	█	█	█	█	█	█	█	█
Asset integrity inspection	Scheduled	3.5 days	█	█	█		█					█
Inspection (subsea survey), assessment of scour, seabed materials	Scheduled	3 days	█	█	█	█	█					█
Marine growth removal (on ladder and foundation)	Corrective, as required	1 day	█	█	█	█	█	█	█	█	█	█
Guano removal (on ladders and access areas) *	Corrective, as required. Guano will not be removed from nesting compartments.	0.5 days	█	█	█	█	█	█	█	█	█	█
Repairs & replacements of electrical installations (navigation lights etc.) **	Corrective, as required, dependent on result of routine maintenance.	3 days	█	█	█	█	█	█	█	█	█	█
Repainting and associated preparatory works e.g. sand blasting **	Corrective, as required, dependent on result of routine maintenance.	14 days	█	█	█	█	█	█	█	█	█	█
Debris removal **	Corrective, as required. Rare frequency expected.	0.5 days	█	█	█	█	█	█	█	█	█	█
Major component replacement such as boat landing & ladder replacement **	Corrective, as required. Rare frequency expected.	14 days	█	█	█	█	█	█	█	█	█	█

* Note, guano removal may be required more than once per year.

** Note, whilst these activities are only expected once every 5 or 10 years, there will be a need for quick, reactive maintenance as required throughout the operational lifetime of the ANS. This is denoted by the hashed boxes.

Figure 6: Indicative maintenance schedule – nearshore ANS.

7 Consent and Approvals for Implementation

7.1.1.1 Thorough consideration has been given to the consenting and planning requirements for the development of ANS at all stages of the site selection process.

Onshore sites

7.1.2 Hartlepool – Old Yacht Club (onshore)

7.1.2.1 For the installation of ANS within the terrestrial/onshore environment, specifically the two ANS at the Old Hartlepool Yacht Club, planning permission is required under the Town and Country Planning Act 1990 from the relevant Local Planning Authority (Hartlepool Borough Council).

7.1.2.2 Orsted commenced engagement with Hartlepool Borough Council in June 2021 with regards to their compensation proposals. This included a site visit in July 2021 which was attended by Hartlepool Borough Council's planning officers and ecologist. An EIA screening opinion and pre-application advice request was submitted to Hartlepool Borough Council in July 2021. In response, a pre-application advice response (reference I/2021/0187) was received from Hartlepool Borough Council on 17/09/2021 which confirmed that the "proposals are acceptable in principle". An EIA screening response was received on 24/09/2021 (ref H/2021/0405), confirming that an EIA was not required.

7.1.2.3 A planning application was submitted to Hartlepool Borough Council on 15/12/2021. This was validated on 27/01/2022 (reference H/2022/0009). Following the statutory and public consultation period, Orsted responded to comments and worked closely with Hartlepool Borough Council to resolve outstanding areas of concern. This resulted in a positive decision in Hartlepool Borough Council planning officer's report¹² which concluded "the proposal in the context of relevant planning policies and material planning considerations is acceptable" and recommended approval. However, during the planning committee meeting on 22/06/2022, four local councillors voted in favour of the application and seven voted against the application, which meant that planning permission was refused.

7.1.2.4 Orsted submitted an appeal to the Planning Inspectorate on 18/10/2022 (reference APP/H0724/W/22/3309272). Subject to the appeal programme, a decision is expected in Q1 - Q2 2023.

Nearshore sites

7.1.2.1 For the installation of ANS below Mean High Water Springs, Orsted will secure a marine licence from the MMO under the Marine and Coastal Access Act 2009.

7.1.2.2 For completeness, it is noted that the locations of the ANS at [REDACTED] Lowestoft and Minsmere are below Mean Low Water and, therefore, planning permission from the relevant Local Planning Authorities (East Suffolk Council and Durham County Council) is not required. However, given the nearshore location, Orsted have engaged in consultation meetings with both authorities (as detailed in the Consultation Summary Report, document reference number 07337257_A). In addition, formal pre-application advice requests were submitted to East Suffolk Council on 20/04/2022 for Lowestoft and 17/05/2022 for Minsmere. Formal pre-application planning advice was provided by East Suffolk Council on 23/06/2022 for Lowestoft (reference DC/22/1612/PREAPP) and on 24/06/2022 for Minsmere (reference DC/22/2031/PREAPP) which was taken into consideration as part of the respective marine licence applications.

7.1.3 [REDACTED] – CONFIDENTIAL & COMMERCIALY SENSITIVE

7.1.3.1 [REDACTED]

¹² Available in the public domain here: https://www.hartlepool.gov.uk/meetings/meeting/4296/planning_committee (see Section 4.1).

7.1.3.2

[REDACTED]

7.1.3.3

[REDACTED]

7.1.4 Lowestoft (nearshore)

7.1.4.1 An EIA Screening request was submitted to the MMO on 17/05/2022 with respect to the construction of ANS within the Lowestoft ANS Search Area. On 05/09/2022, the MMO confirmed the works proposed would not require an EIA under the Marine Works (Environmental Impact Assessment) Regulations 2007 (reference EIA/2022/00016).

7.1.4.2 A marine licence application (MLA/2022/00287) was submitted to the MMO on 06/07/2022 for the construction and maintenance of up to two ANS for kittiwake within the "Lowestoft ANS Search Area". This was followed by a statutory and public consultation period which closed on 22/08/2022 and 31/08/2022 respectively. The MMO's HRA (dated 09/11/2022) concluded that the proposed project would not have an adverse effect on the integrity on designated sites, either alone or in-combination with other plans of projects. Orsted are holding regular meetings with the MMO and the marine licence is expected to be granted in Q4 2022 – Q1 2023.

7.1.5 Minsmere (nearshore)

7.1.5.1 An EIA Screening request was submitted to the MMO on 17/12/2021 with respect to constructing ANS within the Minsmere ANS Search Area. On 27/01/22, the MMO confirmed the works proposed would not require an EIA under the Marine Works (Environmental Impact Assessment) Regulations 2007 (reference EIA/2021/00052).

7.1.5.2 A marine licence application (MLA/2022/00333) was submitted to the MMO on 02/08/2022 for the construction and maintenance of one ANS for kittiwake within the "Minsmere ANS Search Area". This was followed by a statutory and public consultation period which closed on 29/09/2022 and 30/09/2022 respectively. The MMO's HRA (dated 31/10/2022) concluded that the proposed project would not have an adverse effect on the integrity of designated sites, either alone or in-combination with other plans of projects. Orsted are holding regular meetings with the MMO and the marine licence is expected to be granted in Q4 2022 - Q1 2023.

8 Monitoring and Adaptive Management

8.1 Monitoring

8.1.1.1 Para. 3 of Part 1 of Schedule 14 of the DCO establishes that the KIMP must provide details of the proposed ongoing monitoring of the measures including:

- Survey methods and survey programmes;
- Project reviews;
- Details of how natal dispersal¹³ and colony interchange with the FFC kittiwake colony will be considered; and
- Proposals for assessing any evidence of additional productivity to the FFC SPA.

8.1.1.2 The following sections provide a comprehensive overview of the intended monitoring approaches, DCO requirements and OOEG alignment around the current technological limitations associated with determining natal dispersal and colony interchange.

¹³ Natal dispersal - permanent movement an individual makes from its birth site to the place where it reproduces or would have reproduced if it had survived.

8.1.2 Introduction

- 8.1.2.1 Pre-construction baseline monitoring (colony counts and productivity) provides a benchmark for existing kittiwake prior to the implementation of the compensation and permits future comparisons and perspective at a regional scale. Pre-construction baseline monitoring commenced at existing kittiwake colonies within the two search zones (North East and East Anglia) in 2021. Ten potential colonies were considered (< 20 km from a proposed ANS) for baseline monitoring and were refined in discussions with the OOEG. In the East Anglia zone, Sizewell and Lowestoft colonies were selected, and in the North East zone, Boulby, Saltburn, Hartlepool, and Seaham were selected. Monitoring locations, methods and scope were also discussed and agreed upon by the OOEG.
- 8.1.2.2 At each ANS, colonisation monitoring ([Section 8.1.4.4](#)) will be implemented from the first breeding season following construction, with baseline monitoring added when structures begin to be colonised i.e. from when the first 'trace' nests¹⁴ are detected. Monitoring will commence from the breeding season following ANS implementation. Monitoring at existing colonies and those associated with the artificial structures will also continue post-construction and throughout the operational phase of Hornsea Three (currently expected to be 35 years) to measure ANS success, identify barriers to success and inform whether adaptive management measures should be considered.
- 8.1.2.3 The core data to be collected for baseline monitoring at existing colonies and at the Orsted onshore and nearshore ANS colonies are colony counts and basic productivity, following methods detailed in Walsh *et al.* (1995) and in line with JNCC's Seabird Monitoring Programme (SMP). Data collection is (and will continue to be) carried out by at least two trained observers (paired to meet Orsted Health and Safety requirements).

8.1.3 Survey platforms

- 8.1.3.1 The most suitable survey platform from which baseline data can be gathered will be dependent on the location and design of the ANS. For example, at onshore sites, baseline data can be collected from vantage points on land with observers using binoculars and/or telescopes or from within the structure itself. ANS in the nearshore environment would require boat based visual observations or drone surveys to allow complete coverage of the colony for counts and productivity monitoring. Monitoring from shore is also likely to be feasible for parts of the nearshore ANS. During a consultation meeting on 21/01/2022, JNCC stated they do not in principle object to the use of drones for monitoring but disturbance to kittiwake needs to be carefully considered. In addition, drone monitoring was agreed in principle as a suitable method with the OOEG at technical panel #8 on 15/12/2021.

8.1.4 Baseline monitoring at all colonies (existing colonies, onshore ANS and nearshore ANS)

- 8.1.4.1 Broad agreement was reached with the OOEG (during technical panel meetings #2 on 14/04/2021 and #3 on 26/05/2021) on baseline monitoring, this includes colony counts and productivity surveys.

Core data: Colony counts

- 8.1.4.2 A minimum of one full colony count will be made at each site during the latter half of the incubation period (mid-June), when numbers of nests are most stable. The count unit for kittiwake is AON, defined as a well-built nest capable of containing eggs with at least one adult present. Additional counts of site-holding birds with even a trace of a nest will also be made where practicable, to give an indication of site attractiveness to prospecting first time breeders. At the ANS the total number of AONs and nesting attempts (trace nests) will be recorded on each productivity visit (see [Section 8.1.4.3](#) below). If applicable (i.e., at all ANS and within productivity plots at existing colonies), total numbers of AONs documented from mapped nests throughout seasonal productivity monitoring (i.e., multiple visits throughout the season) will be used alongside the June colony counts to provide a maximum AON count for each colony annually.

¹⁴ Trace nests are defined as per the seabird monitoring handbook (Walsh *et al.* 1995): site-holding birds with even a trace of a nest.

Core data: Productivity

- 8.1.4.3 Productivity will be monitored using the mapped nests method (method 1 in Walsh *et al.* (1995)). Each ANS will be treated as a separate colony, and it is intended to monitor all nests on all ANS. A minimum of three visits to record nest contents for productivity calculations will be made each year. First and second visits will be made in late May and mid-June respectively, and nests marked (or updated in later years) on photographs/sketch maps of the colony. The status of each nest will be noted on each visit using the recording codes of Walsh *et al.* (1995). On a third visit (close to estimated time of first chicks fledging, generally early to mid-July) all nests recorded in the first visit will be re-checked. Additional visits will be made, if necessary, depending on the synchrony of the breeding season, i.e., if there are a number of late broods with small young, a fourth visit may be made 5-7 days later to assess the fate of these nests. The contents of each nest will be noted, and if present, the number and age of chicks recorded. Whole colony productivity will be calculated as the number of chicks likely to fledge divided by the number of completed nests for each site or plot (following Walsh *et al.* (1995)). Where colonies are large (>750 pairs, namely at natural cliff colonies), a sub-sample of plots will be chosen to be representative of an even spread across the whole colony. Plots will be selected systematically ensuring the centre and edges of the colony are covered, containing nests at a range of altitudes. At some natural colonies, health and safety concerns (i.e. tides and safe cliff-top access) may constrain access to some areas of the colony and this will be factored in to choice of productivity monitoring plots. Plot locations will be mapped and included in annual reporting.

Colonisation monitoring

- 8.1.4.4 Once the ANS are in place, but before a colony is established, a period of colonisation monitoring will take place each breeding season. This will include two survey visits made annually (ideally around mid-June and late July) where any AON, trace nests, or prospecting birds will be counted. The Secretary of State requires (Para. 3(f) of Part 1 of Schedule 14 of the DCO) information on: "*the number of birds colonizing the site; evidence of birds prospecting; nesting attempts; egg laying; hatching; and fledging*". Following discussion with the OOEG, colonisation monitoring may also involve additional systematic monitoring (potentially, and if feasible, by means of remote sensing with cameras) of the ANS to assess the prevalence of prospecting kittiwake (birds seen around/on the structure) and any early nesting attempts (birds seen bringing nesting material to structure and/or pair bonding behaviour). The presence of AON(s) or trace nests recorded during a census visit would initiate baseline monitoring with its inclusion of productivity monitoring ([Section 8.1.4.3](#)).

8.1.5 Additional Monitoring (onshore ANS)

- 8.1.5.1 The intensity and type of monitoring activities undertaken in addition to the baseline monitoring ([Section 8.1.4](#)) will be limited by site specific factors regarding accessibility of colonies, health and safety risks to surveyors and potential disturbance to breeding birds. It will not be practicable to carry out certain monitoring activities at all ANS and therefore the most suitable monitoring will be undertaken. An overview of monitoring activities planned for each type of site i.e. nearshore ANS, onshore ANS and existing colonies is outlined in [Table 8-1](#).

Monitoring of natal breeding dispersal

- 8.1.5.2 The DCO schedule requests Orsted to consider natal dispersal from artificial colonies and colony interchange with the FFC SPA kittiwake colony (Para. 3(g) of Part 1 of Schedule 14 of the DCO). Orsted has fully explored this consideration as part of OOEG discussions. Consensus was reached (during technical panel #3 on 26/05/2021) that it is not possible to quantitatively measure natal dispersal with current technologies¹⁵. The OOEG are in agreement that it is not possible as yet given technological limitations (e.g. size and weight of device), to use satellite, radio or archival tags and loggers for determining natal dispersal of kittiwake. However, the most feasible way of gathering evidence to qualitatively support this requirement would be to undertake chick ringing at the ANS. Ringing chicks with uniquely engraved colour-rings allows individuals to be re-sighted in subsequent years which will provide

¹⁵ It is possible that new technologies or attachment methods may be developed during the timescales involved in this project, which could enable more comprehensive studies on natal dispersal and colony interchange to be undertaken. In this event, such developments and their potential for additional study opportunities will be considered and discussed with the OOEG.

qualitative evidence of interchange between colonies. However, resighting of colour-ringed individuals recruiting to large colonies with restricted visibility of nests, such as FFC SPA, will be low. It is therefore not possible to measure empirically the recruitment of birds into the FFC SPA kittiwake population from the ANS and therefore their overall contribution to productivity, a point that has been confirmed in discussions with the OoEG.

- 8.1.5.3 To qualitatively assess natal dispersal, Orsted will undertake colour ringing of chicks at ANS where it is practicable and safe to do so. Due to the risks associated with accessing nearshore structures, Orsted can commit to carrying out ringing activities at the two onshore ANS at Hartlepool. These data will allow for determination of natal dispersal rates from the ANS caveated by the use of generic survival rates (e.g. Horswill & Robinson, 2015) as a proxy for site-specific survival rates. Systematic re-sightings of individuals colour-ringed as chicks at the natal ANS will provide for an estimation of natal philopatry¹⁶ and will be undertaken alongside re-sightings as set out in [Section 8.1.5.4](#). Any re-sightings of colour-ringed birds away from the ANS at which they were originally ringed as chicks or adults, will be additional to the systematic monitoring for colour-ringed birds to be conducted by Orsted, the latter at the ANS. All such re-sightings by other persons, whether as part of other studies not commissioned by Orsted or from causal observations by birdwatchers, can be expected to be reported by the finder to the British Trust for Ornithology (BTO) (who maintain the National Ringing Database) and from there, accessible to Orsted.

Adult survival

- 8.1.5.4 Colour ringing of breeding adult kittiwake accompanied by a systematic re-sighting programme at the colony i.e. setting up a Retrapping Adults for Survival (RAS) project¹⁷ will be carried out at ANS, where it is practicable and safe to do so, i.e. onshore sites only. The RAS project will allow adult survival rates for the ANS to be calculated in due course, providing adequate re-sighting effort is achieved and sufficient numbers of breeding adult birds are ringed each year. To gain reliable colony-specific adult survival rates, a marked population of 100-150 adults would need to be maintained (O'Hanlon *et al.* 2021). A systematic re-sighting programme of colour-ringed adults at the onshore ANS (identified in [Section 8.1.2](#)) will be established, guided by the findings of O'Hanlon *et al.* (2021)'s analysis of the effect of the number of visits on resighting probability. This would be additional to the prescribed baseline monitoring visits ([Section 8.1.2](#)).

Diet studies

- 8.1.5.5 During the ringing activities at the pre-construction phase and beyond, efforts will be made to collect diet samples from any regurgitates produced by birds during handling at the onshore ANS and at neighbouring colonies where ringing is undertaken by volunteers. Samples from individuals will be stored separately, with the breeding location, date and nest status (e.g. eggs/chick) noted on each sample. Samples will be frozen for storage and analysed annually to investigate barriers to success which relate to prey availability. Dietary analyses will be carried out by suitably qualified professional biologists to estimate the frequency of occurrence and biomass proportions of prey species.
- 8.1.5.6 The proposed methodology for diet analyses is to follow those used by UKCEH as part of the Isle of May long-term study (IMLOTS) e.g. methods stated for chick diet in Newell *et al.* (2016). Regurgitates and food loads will be weighed, fish identified and, where possible, measured (total length, snout to tip of tail), and an initial estimate of diet composition made. Fish otoliths will be extracted from regurgitates, identified and measured. The weights of the fish from which they came will be calculated from otolith length/fish length and fish length/mass regression relationships from published relationships. Biomass proportions will be derived from initial estimates of diet composition, with species confirmed from identification of bones, or from fish mass estimates from otoliths where initial assessments are unavailable.

¹⁶ Natal philopatry - the tendency of an animal to return to their birthplace to breed.

¹⁷ This involves catching adult birds on the nest for colour ringing, then making an effort to record/re-sight colour ringed birds at the site. Further details can be found on the scheme on the BTO website - <https://www.bto.org/our-science/publications/birdtrends/2020/methods/retrapping-adults-survival-scheme>

8.1.6 Monitoring considerations

- 8.1.6.1 At the Hartlepool onshore ANS, internal access to nesting ledges enables safe access to conduct bird handling activities (i.e. ringing and diet studies) and also avoids undue disturbance to the colony. The ANS located in the nearshore environment would require vessel access and transfer of personnel multiple times throughout the breeding season to carry out these activities. The risk associated with marine access compared to the value of the data gained (i.e., largely qualitative, and additional to requirements stated in the DCO, see [Table 8-1](#)) means it is not practicable to carry out bird handling at these sites. Accessing birds on nests at many existing colonies is also not possible without causing undue risk to surveyors and/or disturbance to breeding colonies. Therefore, monitoring at the nearshore ANS will be similar to that which can normally be carried out at existing natural colonies.
- 8.1.6.2 Baseline monitoring for the nearshore ANS can be carried out from surveys external to the ANS. To ensure all faces of the ANS can be monitored, Orsted intends to carry out these surveys using drones and/or boat-based visual observations. Orsted's preference would be for drone surveys conducted from land-based vantage points. During OOEG technical panel #8 on 15/12/2021, Natural England and RSPB agreed that the use of a drone will be appropriate and can deliver the required monitoring results at seabird colonies.
- 8.1.6.3 Birds are likely to be more prone to disturbance during the early stages of colony establishment. Therefore, studies which involve bird handling will not commence until it is deemed they will not compromise the colonisation process or success of the structures. Any monitoring method noted to cause undue disturbance to birds, or that could have an adverse impact on the success of the compensation measure, will be ceased and reviewed as soon as is practicable.

8.1.7 Annual review of monitoring

- 8.1.7.1 The annual monitoring approach and survey programme are presented in [Table 8-1](#) and [Table 8-2](#) below. The requirement which each monitoring activity fulfils is stated based on Para. 3 of Part 1 of Schedule 14 of the DCO.

Table 8-1. Overview of annual monitoring activities planned as part of the compensation measures.

Annual monitoring	DCO requirement fulfilled (Para. within part 1 of Schedule 14)	Onshore ANS	Nearshore ANS	Existing colonies
Colony count (1 visit)	Para. 3 (f): number of birds colonising the site and number of nesting attempts	✓	✓	✓
Productivity (minimum of 3 visits)	Para. 3 (f): number of nesting attempts; evidence of egg laying; hatching; and fledging	✓	✓	✓
Colour-ringing of chicks	Para. 3 (g): details of how natal dispersal and colony interchange with the FFC kittiwake colony will be <u>considered</u>	✓	x	x*
Colour-ringing of breeding adults (RAS)	Not specifically stated in DCO: aim to gain site specific survival estimates for input to success criteria (Para. 3 (d))	✓	x	x*
Diet Samples	Not specifically stated in DCO: will contribute to investigating barriers to success (Para. 3 (f))	✓	x	x*
	Survey platform:	Land based vantage point / internal access to ANS	Drone surveys (from land/ vessel) and/or boat-based observations	Land based vantage point

*Bird handling opportunities will be explored at existing sites where it is practicable to do so.

Table 8-2. Expected survey program at each ANS site.

Red text below shows intended monitoring at onshore ANS, blue text shows intended monitoring at nearshore ANS and grey text shows intended monitoring at neighbouring colonies.

Month	Colony Count (number of visits)			Productivity (number of visits)			Ringing (chicks & adults) & diet studies (number of visits)			Systematic re-sighting effort at ANS (number of visits) for RAS studies		
	Onshore ANS	Nearshore ANS	Neighbouring colonies	Onshore ANS	Nearshore ANS	Neighbouring colonies	Onshore ANS	Nearshore ANS	Neighbouring colonies	Onshore ANS	Nearshore ANS	Neighbouring colonies
March – July (pre-incubation – chick rearing)										✓ (multiple visits)	X	X
Late May – early June (incubation)				✓ (1)	✓ (1)	✓ (1)						
Mid-June (peak incubation/ early chick stage)	✓ (1)	✓ (1)	✓ (1)	✓ (1)	✓ (1)	✓ (1)						
July – ~early August (chick-rearing / fledging)				✓ (1+)	✓ (1+)	✓ (1+)	✓ (multiple visits)	X	X			

8.2 Adaptive Management

- 8.2.1.1 The compensation measure will be ‘implemented’ for the purposes of Para. 4 of Part 1 of Schedule 14 of the DCO once the construction of all four ANS has been completed. As detailed in Section 6, following construction of the ANS and prior to Hornsea Three operation, any work to the ANS outside of planned maintenance will be considered as structure maintenance.
- 8.2.1.2 Adaptive management will be implemented, if necessary, after Hornsea Three is operational. Orsted will take a practical approach to determining if adaptive management actions are required before Hornsea Three is operational and will discuss options with the OoEG.
- 8.2.1.3 During the lifetime of the ANS, a surplus or debt of kittiwake with respect to the required compensation number of 73 may be determined by monitoring. If any kittiwake debt or surplus is accrued during this time, it will be given due consideration within each monitoring years’ success criteria calculations (as discussed in Section 9). As outlined in the certified plan (the KCP) pursuant to Article 36 of the DCO, adaptive management will be an iterative process which combines management measures and subsequent monitoring with the aim of improving effectiveness of the measure, whilst also updating knowledge and improving decision making over time. Adaptive management will be an important component of the compensation measures and will be used as a method to address unforeseen issues or deviations from expected outcomes of the compensation (e.g. low colonisation rate of structure).

- 8.2.1.4 Through considerate design and careful site selection, it is the intention that the ANS will not require any substantive management actions (i.e., outside of general structure maintenance) during the lifetime of Hornsea Three, though it is important to remain mindful of unexpected and unforeseen events which might require adaptive management (e.g. lack of colonisation despite in-depth site selection; or predation risk e.g. from corvids). It is Orsted's intention that all foreseen risks are mitigated as much as possible through good design of the ANS and planned maintenance.
- 8.2.1.5 Further adaptive management options may become apparent and will subsequently be explored as the monitoring of the ANS and associated kittiwake nesting is undertaken (see [Figure 7](#)). If relevant (i.e., requiring discussion with OOEG members), OOEG members will be notified, and discussion points will be set for annual OOEG meetings (See [Section 8.3](#) and [Figure 8](#)). Kittiwake populations show a varying degree of interannual variability so population variability will be an integral consideration, alongside review of monitoring results, before any subsequent adaptive management measures are considered. Adaptive management will only be undertaken in relation to the ANS and not existing, 'natural' breeding kittiwake colonies.
- 8.2.1.6 Measures that have been discussed with the OOEG in relation to the potential adaptive measures include:
- Extension of ANS to facilitate further nesting spaces¹⁸ which will include the provision of additional nesting structures if capacity in one location is exceeded;
 - Relocation of nesting structure¹⁹;
 - Additional protection from the elements;
 - Enhanced predator deterrents;
 - Provision of nesting material, such as soil and dry vegetation;
 - Enhanced recruitment support – kittiwake calls, decoys etc; and
 - Provision of supplementary food.
- 8.2.1.7 The likely trigger points ([Figure 7](#)) for the application of adaptive management will relate to:
- Population trends (at ANS and of the wider population);
 - Colony establishment rates; and
 - Productivity trends (at ANS and of the wider population).
- 8.2.1.8 Adaptive management thresholds will be informed by monitoring of the ANS. The link between specific adaptive management actions and how they will be informed by monitoring has been discussed with OOEG members during the technical panel meetings. It has been agreed that ongoing consultation on the need for adaptive management will be undertaken with the OOEG post ANS construction (as indicated by [Figure 7](#) and [Figure 8](#)). The core monitoring of the above three drivers (breeding population, colony establishment and productivity) will be able to inform decisions relating to adaptive management. Some factors may be beyond the control of Orsted and may therefore not trigger adaptive management measures. This process has been highlighted within [Figure 7](#) and [Figure 8](#) and will be informed by the monitoring process detailed in [Section 8.1](#).
- 8.2.1.9 It is not necessarily appropriate to set quantitative timescales for trigger points in relation to adaptive management due to the complexity of potential issues (i.e., the drivers of population trends at the ANS). At this stage, quantitative trigger points would only permit hypothetical and therefore potentially incorrect timescale estimates. A more appropriate approach, which has been discussed and agreed within the OOEG, is presented in [Figure 7](#). This sets out the process of determining trigger points based on a review of monitoring each year following the breeding season. This will permit the monitoring results to be viewed in context of the ANS baseline monitoring results and that of neighbouring kittiwake colonies, as well as data and trends at a wider regional and national level. If necessary, this process will inform the most appropriate response in terms of adaptive management.

¹⁸ It is noted that 500 nesting spaces have been assumed for design purposes to provide an even, rounded number. This already provides over and above the required number of nesting spaces (404-467) to compensate for 73 kittiwake per year.

¹⁹ In addition to the potential need to relocate an ANS for the purpose of adaptive management, relocation of the nesting structures may also be required in extreme, unforeseen events e.g. that may arise as a result of climate change or sea level rise, or as a result of sandbank movement which may result in impacts to navigation.

- 8.2.1.10 The approach to identifying appropriate adaptive management will follow a hierarchy-based system. At this stage, a hypothetical example has been presented in **Figure 7** and in reality, the process would be discussed with the OOEG during the monitoring phase of the ANS.
- 8.2.1.11 As a result of the 2022 outbreak of highly pathogenic avian influenza (HPAI) in the UK it may also be necessary to react to potential cases or prevent the spread of cases. Any work undertaken during a HPAI outbreak will be conducted in line with statutory advice and guidance and will be captured in monitoring reports.

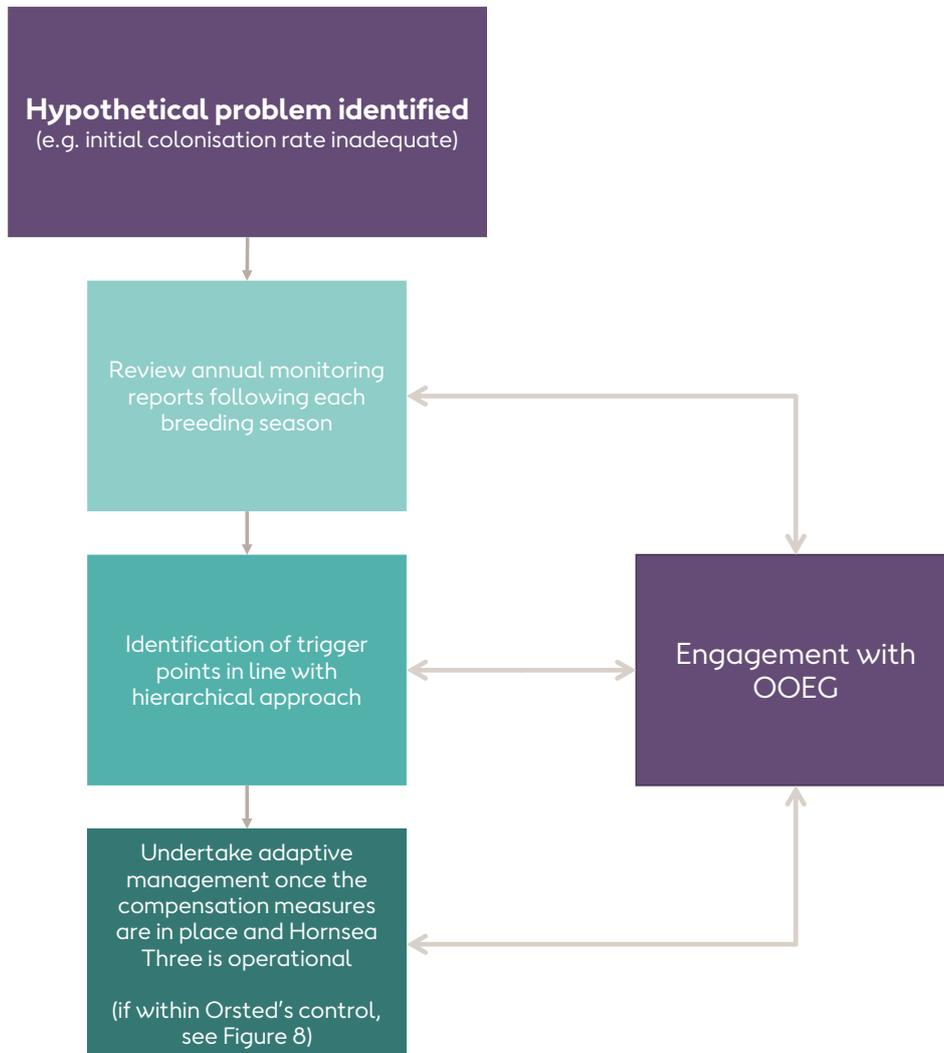


Figure 7: Flow diagram illustrating the process of identifying trigger points for adaptive management.

8.3 OOEG Engagement in Adaptive Management

- 8.3.1.1 As outlined in [Section 8.2.1.9](#), monitoring of the ANS will be used to inform a hierarchy-based approach to determine trigger points for adaptive management (presented in [Figure 7](#)). [Figure 8](#) presents a schematic overview of how monitoring will determine the level of input required by OOEG members.
- 8.3.1.2 Those issues which are classed as 'non-ecological' are deemed not to require discussion with OOEG members based on their simplicity. In this instance, OOEG members would be notified by email and any actions summarised as part of the OOEG reporting process. Ecological issues related to breeding kittiwake are likely to be more complex and therefore require discussion with OOEG members regarding appropriate next steps. Such issues would be highlighted to OOEG members ahead of the bi-annual OOEG meetings (planned to take place pre- and post-breeding season) in which the issue would be discussed and, if necessary, appropriate action identified.

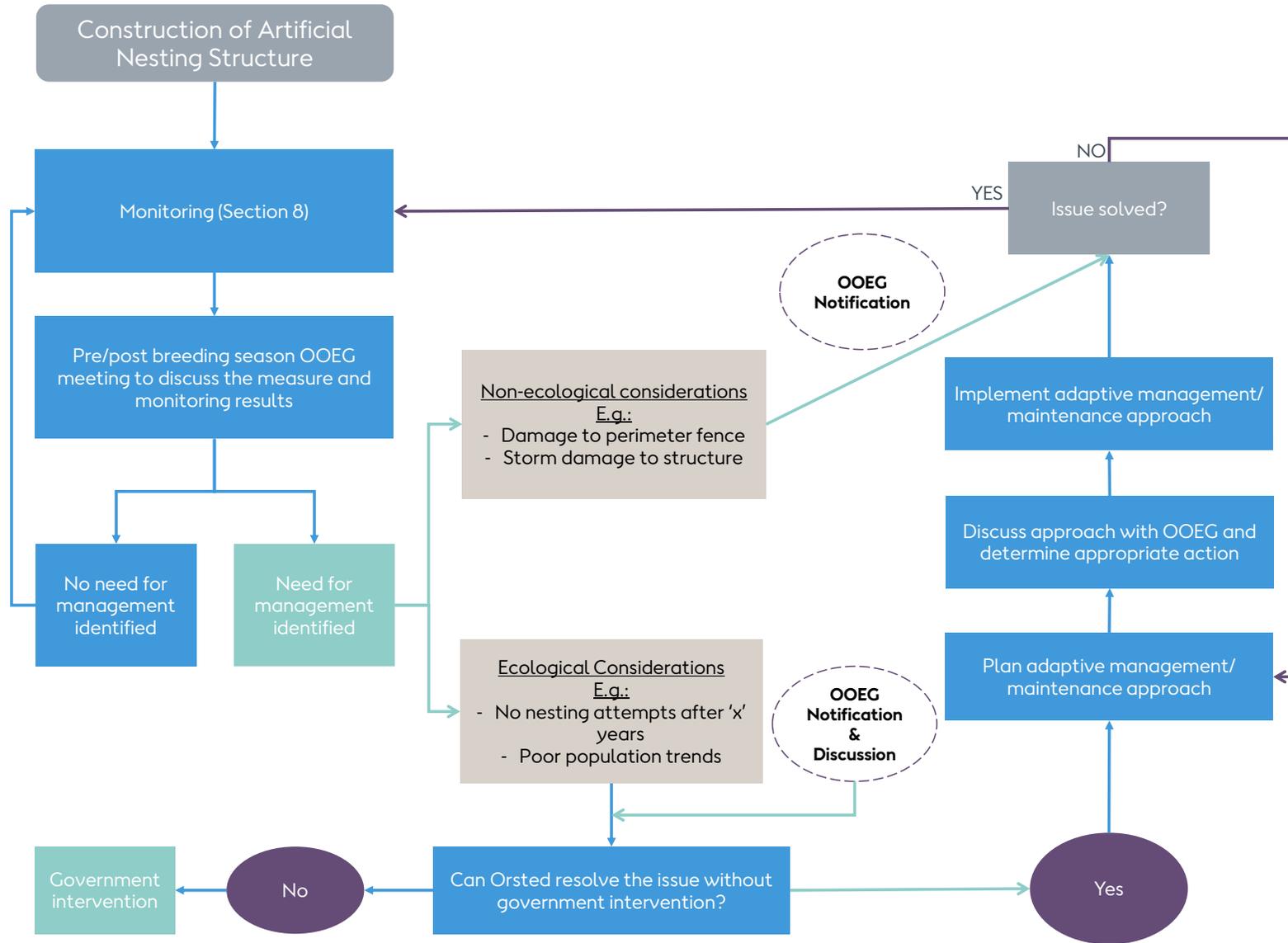


Figure 8: Flow diagram outlining the process informing the OoEG of adaptive management solutions.

9 Success Criteria

- 9.1.1.1 The KCP (certified plan pursuant to Article 36 of the DCO, as submitted by Orsted in September 2020 during the determination process) established in Annex 2: Ecological Evidence²⁰ a precautionary, yet realistic, set of assumptions on which to calculate the number of breeding pairs required to deliver a minimum of 73 breeding adults to the existing wider breeding population (biogeographic population). To calculate the breeding population required to achieve this number requires several factors to be considered, these being productivity, age at first breeding, survival rates and breeding dispersal. In predicting the target population to achieve 73 adult breeding kittiwake each year, an average productivity rate of 0.819 was taken as calculated for colonies located in the east of the UK in the Horswill & Robinson (2015) recommended estimates of demographic rates.
- 9.1.1.2 Productivity rates and occupancy at each ANS will however vary between years in response to site-specific, regional, and national factors. Therefore, measurement of productivity annually will be a key parameter to be used in calculating whether the individual ANS cumulatively deliver what equates to 73 additional birds per annum over the lifetime of the Hornsea Three (currently expected to be 35 years), to the existing wider breeding population. As stipulated in Para. 7 of Part 1 of Schedule 14 of the DCO, each ANS shall be maintained for as long as they are colonised, and planned maintenance and adaptive management measures and monitoring must continue whilst the ANS are in place. A model will, with each successive year, be populated from the ongoing monitoring of each ANS, with year-specific data on colony size and productivity used to monitor progress and future requirements of the ANS, in delivery of this compensation measure to provide 73 additional birds annually over Hornsea Three's lifetime to the wider breeding population. This future projection of the number of nests required will be modelled to discharge the accrued debt or surplus in productivity achieved cumulatively across the ANS which was targeted for the current and past years. The model's future projection would ordinarily be described using the latest year's productivity rate for each ANS. Circumstances may arise that lead to seeking a consensus of expert opinion from OOEG as to the projected productivity rate following e.g., a breeding failure due to a now extinguished disturbance event.
- 9.1.1.3 Orsted's success criteria are therefore based on an ongoing review process which will identify aspects required to deliver compensation for 73 kittiwake per year (cumulatively across the four structures) whilst also discharging accrued debt or surplus in productivity as monitored. Whilst each ANS will have the capacity to each support a minimum of 467 nesting pairs of kittiwake, providing the required compensation when using a precautionary, yet realistic, set of assumptions ([Section 9.1.1.1](#)), the metric of success is linked directly to the overall productivity of the four ANS to cumulatively deliver 73 kittiwake per year to the existing wider breeding population.

10 Reporting

- 10.1.1.1 Paragraphs 5 and 6 of Part 1 of Schedule 14 of the DCO establish the reporting requirements that will be adhered to by Orsted in relation to the ANS. These are as follows:
- 5. The undertaker shall notify the Secretary of State of completion of implementation of the measures set out in the KIMP.*
- 6. Once the measures have been implemented the undertaker shall provide an annual report to the Secretary of State on the progress of the measures as detailed in the KIMP.*
- 10.1.1.2 The first report to the Secretary of State will therefore be provided following the end of the first breeding season, with annual reports following thereafter. Project reviews will take place after each breeding season, in consultation with the OOEG, once monitoring reports are available. It is anticipated that these annual reports will capture the level of breeding success at the structures, along with other pertinent information gathered from the monitoring of the birds associated with these structures and continued monitoring of existing colonies (as detailed within [Section 8](#) of this KIMP).

²⁰ [Annex 2 to Appendix 2: Kittiwake Artificial Nest Provisioning: Ecological Evidence](#)

11 Programme for Implementation and Delivery

- 11.1.1.1 As identified in Para. 3 of Part 1 of Schedule 14 of the DCO, the ANS must be in place four full kittiwake breeding seasons²¹ prior to the operation of any turbine forming part of the authorised development. Orsted has therefore been developing the proposals with a view to structures being in place by end of February 2023, based on the programme presented in [Figure 9](#).

²¹ [CONFIDENTIAL & COMMERCIALY SENSITIVE]

12 Prey Availability Resource Measures

12.1 Overview

12.1.1.1 Paragraph 3(i) of Part 1 of Schedule 14 of the DCO relates to Orsted's commitment to conduct research into prey availability:

(i) details of the work within the exploration of prey availability measures as set out in Appendix 1 of the response from the undertaker to the Secretary of State's minded to approve letter dated 1 July 2020, that could support practical management measures to increase prey availability, and which should be undertaken alongside the artificial nest site installation.

12.1.1.2 Orsted identified two research opportunities in the Kittiwake Prey Resource report (Response to the Secretary of State's Minded to Approve Letter Appendix 3: Supporting Evidence for Kittiwake Prey Resource)²²:

- Kittiwake diets during the breeding season, and the relationship between prey availability and productivity; and
- Assessing the current and future condition of alternative fish prey populations: a desk-based study.

12.1.1.3 These studies have been identified as priority research areas by the Offshore Wind Strategic Monitoring and Research Forum (OWSMRF) which is an industry-led collaborative forum that aims to better understand the impact of large-scale offshore wind development on marine birds. Specifically, JNCC Report No. 651²³ summarises existing evidence, and potential research opportunities, to better understand the population dynamics of black-legged kittiwakes and how their populations might respond to potential additional mortality from offshore windfarm development and conservation management measures. This report was intended to provide a signpost towards research that can facilitate meaningful and precise cumulative impact assessments, and thus contribute to reducing uncertainty in decision-making around offshore windfarm consenting in the next few years.

12.1.1.4 The Prey Resource report outlines that *"an inter-governmental task force could be formed led by Defra to help steer the work, review any outputs, and consider future proposals on this theme in order to add strategic value."* Orsted has therefore been in discussions with Defra regarding the execution of these research projects and has quarterly meetings to keep Defra updated regarding their progress.

12.1.1.5 Following an initial meeting held with JNCC on 21/01/2022, Orsted contracted JNCC to undertake these works. The aim of this project is to undertake an evidence stocktake of fish prey availability to breeding kittiwakes in the UK, which will then be used to inform novel research on kittiwake-prey interactions in UK waters and the sustainability of these in the future.

12.1.1.6 The work is structured around two work packages. Work package 1 (review work) has three objectives:

- Objective A: Undertake a review of kittiwake diet studies at UK colonies;
- Objective B: Undertake a review of breeding kittiwake foraging distributions from UK colonies; and
- Objective C: Undertake an assessment of current and possible future fish prey availability to breeding kittiwakes.

12.1.1.7 Work package 2 (follow-on project design) has two objectives:

- Objective D: Present outputs of work package 1 to relevant stakeholders and discuss scope of a potential follow-on project;
- Objective E: Based on the outputs of work package 1 and Objective D, design a project specification for follow-on research that would increase our understanding of the responses and resilience of kittiwake populations to spatio-temporal changes in fish prey availability and help inform future prey management measures as part of future compensatory options.

²² [Appendix 3: Supporting Evidence for Kittiwake Prey Resource](#)

²³ JNCC Report No. 651: [Black-legged kittiwake population dynamics and drivers of population change in the context of offshore wind development](#)

12.1.1.8 Work package 1 was undertaken during Q3 – Q4 2022 and the report will be finalised and published in early 2023. Following this, work package 2 will commence with a period of stakeholder consultation which will inform the drafting of the final project specification.

12.1.1.9 Reports will be shared with the OOEG and Defra once the research is complete.

12.2 Strategic Workstreams

12.2.1.1 The research outlined in [Section 12.1](#) is supported by Orsted's wider strategic workstreams and objectives. Orsted has led a developer collaboration to deliver a mechanism for ecological compensation on a strategic basis, which now forms the Derogation Subgroup to the Offshore Wind Industry Council's (OWIC) Developer Group. This group is now led by OWIC. Orsted has been influential in establishing the governance structure for the Collaboration on Offshore Wind Strategic Compensation (COWSC), which was agreed in August 2022. Orsted are represented on the four COWSC Expert Groups for artificial nesting, predator reduction, habitat creation/restoration and infrastructure removal. Orsted has engaged in workshops with Defra and responded to their consultation on draft guidance for Marine Protected Area compensation. Further, Orsted has inputted to the industry response for Defra's call for evidence on sandeel management.

12.2.1.2 Orsted are funding and participating in a research programme with the University of Aberdeen (UoA) and North Highland College's Environmental Research Institute, part of the University of the Highlands and Islands. The research will address knowledge gaps in offshore wind environmental characterisation, by improving understanding of fish migration patterns and providing a vision for next-generation monitoring techniques.

12.2.1.3 Led by Professor Beth Scott (UoA) and Dr Benjamin Williamson (Environmental Research Institute), the PREDICT (Predicting seasonal movement of marine top predators using fish migration routes and autonomous platforms) project will see scientists working closely with industry across a range of multi-disciplinary research themes, spanning ecology, engineering and data analysis. The project will investigate fish migration and how predictions of oceanographic changes to productive regions in time and space may be impacted by climate change, and knock-on effects on top predators (seabirds and marine mammals). PREDICT will support and accelerate development of strategic prediction, survey and analysis methods, so that industry can avoid using locations that have a higher likelihood of overlap with important feeding grounds for seabirds and marine mammals for offshore wind developments now and into the future.

13 Discharge of Consent Condition

13.1.1.1 **Table 13-1** sets out a summary of the Hornsea Three DCO conditions as required to be drafted into the KIMP and which section of the KIMP this detail is provided.

Table 13-1: Summary of DCO requirements as addressed within the KIMP.

DCO Schedule 14 Part 1 (Para. 3)	Section and/or Appendix where requirement is addressed
<i>(a) Details of locations where compensation measures will be deployed and details of landowner agreements demonstrating how the land will be bought or leased and assurances that the land management will deliver the ecology objectives of the KIMP;</i>	Section 4 presents how Orsted has met this requirement by setting out the locations of the ANS and their ecological merits. Further evidence surrounding kittiwake breeding ecology and how it has been drawn upon during the site selection process is provided within the Site Selection Narrative Report (Document reference: 07337541_A) and the Kittiwake Artificial Nest Provisioning: Ecological Evidence report.
<i>(b) details of the designs of artificial nest sites including the number of nesting structures; and how risks from avian or mammalian predation and unauthorised human access will be mitigated;</i>	Section 5 presents how Orsted has met this requirement and a summary of the designs are provided within Appendix A: Design Report , which is accompanied by two appendices: Appendix 1 – Kittiwake artificial nesting structure pattern book; and Appendix 2 – Supporting design information.
<i>(c) an implementation timetable for delivery of the artificial nest structures that ensures all compensation measures are in place to allow four full kittiwake breeding seasons prior to the operation of any turbine forming part of the authorised development;</i>	Section 11 presents how Orsted has met this requirement for the KIMP and shows the programme for implementation and delivery.
<i>(d) details of the proposed ongoing monitoring of the measures including survey methods; survey programmes; success criteria; recording of OOEG consultations and project reviews; details of the factors used to trigger alternative compensation measures and/or adaptive management measures; and annual reporting to the Secretary of State.</i>	The following sections set out how Orsted has met this requirement: Section 3 summarises the consultation that has been undertaken; Section 8 presents the plans for monitoring and adaptive management, including survey methods and annual survey programme (i.e. months in which it will be undertaken each year); Section 9 sets out the success criteria; and Section 10 outlines reporting requirements and project reviews.
<i>(e) details of any adaptive management measures, to include the provision of additional nesting sites if capacity in one location is exceeded;</i>	Section 8 sets out how Orsted has met this requirement and presents the plans for adaptive management.
<i>(f) provision for annual reporting to the Secretary of State, to include details of the use of each site by breeding kittiwake to identify the barriers to success and target the adaptive management measures. This would include the number of birds colonising the site; evidence of birds prospecting, nesting attempts; egg laying; hatching and fledging.</i>	The following sections set out how Orsted has met this requirement: Section 8 presents the plans for monitoring and adaptive management; and Section 10 outlines reporting requirements.

DCO Schedule 14 Part 1 (Para. 3)	Section and/or Appendix where requirement is addressed
<i>(g) details of how natal dispersal and colony interchange with the FFC kittiwake colony will be considered and proposals for assessing any evidence of additional productivity to the FFC</i>	Section 8 sets out how Orsted has met this requirement and presents the plans for monitoring and adaptive management.
<i>(h) details of the artificial nesting site maintenance schedule; and</i>	Section 6 sets out how Orsted has met this requirement and outlines the planned maintenance that will be undertaken throughout the lifetime of the ANS.
<i>(i) details of the work within the exploration of prey availability measures as set out in Appendix 1 of the response from the undertaker to the Secretary of State's minded to approve letter dated 1 July 2020, that could support practical management measures to increase prey availability, and which should be undertaken alongside the artificial nest site installation.</i>	Section 12 sets out how Orsted has met this requirement and summarises progress on Orsted's prey research projects.

14 References

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- Walsh, P.M., Halley, D.J., Harris, M.P., del Nevo, A., Sim, I.M.W., & Tasker, M.L. (1995). Seabird monitoring handbook for Britain and Ireland. Published by JNCC / RSPB / ITE / Seabird Group, Peterborough.

Appendix A
Kittiwake
Implementation &
Monitoring Plan
Design Report