

Kittiwake Implementation and Monitoring Plan

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Revision Summary				
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Description of Revisions			
Rev	Page	Section	Description
1	All	All	New Document
2	7		Updated text in regard to consultation
2	17,18		Removed proposed from Figure 3, 4 and 5.
2	19		Figure included of as built nesting structure.

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ABP	Association of British Ports
AON	Apparently Occupied Nests
BEIS	Department for Business, Energy & Industrial Strategy
CRM	Collision Risk Modelling
DCO	Development Consent Order
DEFRA	Department of Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero
EIA	Environmental Impact Assessment
FFC	Flamborough and Filey Coast
HRA	Habitat Regulations Assessment
KIMP	Kittiwake Implementation and Monitoring Plan
KCSG	Kittiwake Compensation Steering Group
LEEF	Lowestoft Eastern Energy Facility
MMO	Marine Management Organisation
NE	Natural England
RSPB	Royal Society for the Protection of Birds
SoS	Secretary of State
SPA	Special Protection Area

1. INTRODUCTION

East Anglia ONE North Ltd and East Anglia TWO Ltd (hereafter East Anglia ONE North and TWO) offshore windfarm projects are being developed by ScottishPower Renewables. Applications for development consent were submitted to the Planning Inspectorate in October 2019, with consents for both projects being awarded on 31st March 2022. East Anglia ONE North and TWO are discrete projects with individual Development Consent Orders (DCOs); however, they share a portion of the offshore cable corridor, have the same landfall location, and share an onshore cable route. East Anglia ONE North will comprise of up to 67 wind turbines and East Anglia TWO will be comprised of up to 75 wind turbines, with both East Anglia ONE North and TWO Projects located in the Southern North Sea approximately 36 km and 32 km from the Suffolk coast (respectively).

Consents for East Anglia ONE North and TWO were granted on the basis of the Projects delivering compensation for kittiwake associated with the Flamborough and Filey Coast (FFC) Special Area of Protection (SPA).

This document sets out the Kittiwake Implementation and Monitoring Plan (KIMP) for the delivery of the East Anglia ONE North and TWO kittiwake compensation. ScottishPower Renewables are working in collaboration with Vattenfall, who are developing the Norfolk Boreas and Norfolk Vanguard Offshore Windfarms (hereafter referred to as the Norfolk Projects). Further details on the ScottishPower Renewables and Vattenfall collaboration are provided in Section 1.2.

1.1. Consent Requirements

This KIMP has been prepared pursuant to Paragraph 3 of Schedule 18, Part 1 of the East Anglia ONE North Offshore Wind Farm Order 2022 (East Anglia ONE North DCO) and Paragraph 3 of Schedule 18, Part 1 of the East Anglia TWO Offshore Wind Farm Order 2022 (East Anglia TWO DCO; both hereafter referred to as the "compensation schedules"). The relevant requirements this KIMP aims to discharge are summarised below:

Following consultation with the Kittiwake Compensation Steering Group (KCSG), the KIMP must be submitted to and approved by the Secretary of State ((SoS) in consultation with the MMO, the local planning authority for the land containing the artificial nest site, and the relevant statutory nature conservation body). The KCSG must be consulted further as required during the approval process. The KIMP must be based on the strategy for kittiwake compensation set out in the kittiwake compensation plan ¹ and include;

- a) *details of the location where compensation measures will be deployed, why the location is appropriate ecologically and likely to support successful compensation, and details of agreements demonstrating how the land and/or rights will or have been secured to deliver the ecology objectives of the KIMP;*
- b) *details of designs of the artificial nest site including the type of nesting structure; and how risks from avian or mammalian predation and unauthorised human access will be mitigated;*
- c) *an implementation timetable for delivery of the artificial nest structure that ensures relevant compensation measures are in place to allow four full kittiwake breeding seasons prior to the operation of any wind turbine generator forming part of the authorised development;*
- d) *details of the proposed ongoing monitoring of the measures including: survey methods; survey programmes; success criteria; recording of KCSG consultations and project reviews; adaptive management measures and details of the factors used to trigger alternative compensation measures and/or adaptive management measures;*
- e) *details of the artificial nesting site maintenance schedule; and*
- f) *provision for annual reporting to the SoS, to include details of the number of birds colonising the site including: evidence of birds prospecting; nesting attempts; egg laying; hatching; and fledging, to identify barriers to breeding success and target alternative or adaptive management measures.*

¹ The kittiwake compensation plan is Appendix 1 of the Offshore Ornithology Without Prejudice Document. This document was submitted as part of the Projects application and can be found here <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010077/EN010077-009644-ExA.AS-6.SoSQ2.V5%20EA1N%20Offshore%20Ornithology%20Without%20Prejudice%20Compensation%20Measures.pdf>

As the intention is to deliver the compensation for both East Anglia ONE North and TWO Projects together a single KIMP has been drafted to discharge the relevant conditions of the compensation schedules for both DCOs.

1.2. Strategic Approach to Compensation

The Norfolk Projects are also required to deliver kittiwake compensation associated with the FFC SPA. Vattenfall and ScottishPower Renewables have entered into a cooperation agreement and are working collaboratively to deliver a combined solution to meet the kittiwake compensation requirements for their respective projects. Due to the requirement for a greater level of compensation by Vattenfall they have taken a secretarial lead role in the consultation and development of the KIMP. ScottishPower Renewables have prepared this KIMP in line with the approach developed by Vattenfall. Further details on consultation are provided in Section 1.3 and details of the development of the plan are provided in Section 1.4.

1.3. Consultation

Under the Norfolk Projects and East Anglia ONE North and TWO consents, there is a requirement to set up a Kittiwake Compensation Steering Group (KCSG) to discuss and agree the KIMP. A KCSG was set up by Vattenfall in which details of the Norfolk Projects KIMP were discussed; East Anglia ONE North and TWO were in attendance for the third and fourth KCSG meetings (11th August 2022 and 6th October 2022). It is important to note that the KCSG agreed that any discussions and subsequent agreements on compensation that were made at the Norfolk Projects meetings are applicable for East Anglia ONE North and TWO. This is as per agreements made during meeting three, on the 11th August 2022. Details of this are provided in the Agreement Log. Confirmation of this agreement is also provided in the ScottishPower Renewables Plan of Work (EA1N-GEN-ENV-PLN-IBR-000001) which was approved by the Department for Business, Energy and Industrial Strategy (BEIS), now known as the Department for Energy Security and Net Zero (DESNZ) on 16th January 2023.

1.3.1. KCSG Members

The KCSG was comprised of representatives of East Anglia ONE North and TWO, the Norfolk Projects, Natural England (NE), the Marine Management Organisation (MMO), East Suffolk Council, Great Yarmouth Borough Council and the Royal Society for the Protection of Birds (RSPB).

1.3.2. East Anglia ONE North and TWO Consultation

For ScottishPower Renewables to wholly discharge their conditions, an East Anglia ONE North and TWO Project specific KCSG has been established (including the same members of the Norfolk Projects' KCSG). ScottishPower Renewables will liaise with this KCSG via email and allow members to review and comment on the East Anglia ONE North and TWO KIMP and supporting documents prior to formal submission to the SoS. This process is to be followed as previously agreed with the KCSG (see Agreement Log).

Terms of reference, as agreed with the East Anglia ONE North and TWO KCSG members, are detailed in the Kittiwake Steering Group Plan of Work (PoW, EA1N-GEN-ENV-PLN-IBR-000001, submitted on 12th December 2022), as approved by BEIS (16th January 2023).

ScottishPower Renewables have utilised the Agreement Log as prepared by Vattenfall and will update it with any comments received specifically as part of East Anglia ONE North and TWO consultation.

1.4. Document Development

This KIMP, for discharging the relevant conditions of the East Anglia ONE North and TWO consents, has been based on the final iteration of the Norfolk Projects KIMP (PB5640.009.0004 Version 4) which was reviewed by the KCSG and submitted to the SoS in October 2022, with approval provided on the 26th January 2023.

Version One of this East Anglia ONE North and TWO KIMP has been submitted for review to the East Anglia ONE North and TWO KCSG prior to formal submission to the SoS.

1.5. Document Structure

Summarised below is the document structure of this KIMP.

Section	Title	Detail
1	Introduction	Section introduces the projects, the purpose of the KIMP including consent requirements and progress to date.
2	Summary of Proposed Compensation Measures	Outlines the proposed compensation measures.
3	Location of Compensation Measures	Details the area that the kittiwake nesting structure will be constructed and why this location was considered.
4	Details of Landowner Agreement	Outlines the option agreement for lease.
5	Artificial Nest Structure Design	Describes the nest structure and the technical justification to support it.
6	Delivery Timetable	Outlines the programme for construction and implementation of compensation.
7	Maintenance Schedule	Details the maintenance plan of the nesting structure post construction.
8	Artificial nest site, nest dispersal and colony interchange monitoring report	Outlines the ongoing monitoring and reporting aims.
9	Compensation performance and monitoring management	Discusses the need for annual reporting and describes how the success of the compensation delivery is measured, as well as adaptive methods.
10	References	

1.5.1. The Final Submission Structure

The final iteration of the KIMP for submission to the SoS will include the following Annexes:

- Consultation Report: Will summarise consultation undertaken to date by the Norfolk Projects. It will detail KCSG attendees, minutes, dates and other meeting information. Also details any specific East Anglia ONE North and TWO consultation. The Consultation Report will include the following information, where relevant :
 - Signed invitation letters from KCSG members, which outlines the agreement of participation.
 - Agreement Log – Reflects the topics of discussion between members of the KCSG and the Norfolk Projects and East Anglia ONE North and TWO. The Agreement Log outlines topic specific matters agreed, not agreed and any actions to resolve areas of disagreement. This has been provided to the KCSG for review prior to formal submission to the SoS;
 - Email confirmation from members that the Agreement Log is correct.
 - Minutes from the KCSG meetings.

Note, the Norfolk Projects also submitted the following Annexes alongside their KIMP which are applicable to the submission of the East Anglia ONE North and TWO KIMP. These Annexes can be accessed via the Planning Inspectorate (PINS) website; hyperlinks have been provided in the footnotes.

- Kittiwake Structure Concept Design Report: Overview of initial design concepts of the compensation structures²
- Kittiwake Nesting Success on Artificial Structures: Report investigating the nesting success of kittiwake on artificial structures and evaluates the method as a viable compensation tactic. The report provided recommendations which have been considered when designing the proposed nesting structure.³
- Structure Design Detailed Report: Details the specific parameters of the kittiwake nesting structure design and the initially considered nesting tower design (such as the width of each nesting box).⁴
- Kittiwake Structure Final Detailed Drawings: Details the final agreed design plans and detailed drawings of the artificial nesting structures.⁵

2. SUMMARY OF PROPOSED COMPENSATION MEASURES

The general approach to compensation was set out in the Offshore Ornithology Without Prejudice Compensation Measures documents¹. This confirmed that the provision of artificial nesting structures would be the most effective means of compensating for in-combination effects on kittiwake populations. The approach would enable improved productivity for the North Sea kittiwake population from which recruits to the FFC SPA population are drawn.

Following the East Anglia ONE North and TWO examination, concept designs for two options were developed: a wall structure and a tower structure. These options drew inspiration and learning from other artificial nesting structures which have been previously successful; including an artificial tower built on the Tyne and the wall structure which was built at the entrance to Lowestoft harbour. These are summarised in the Concept Design Report².

A study was subsequently undertaken by MacArthur Green (2021) to examine existing use of artificial structures by kittiwakes in the UK (at Dunbar, along the Tyne and in Lowestoft;) to ascertain the features of artificial sites associated with higher breeding success. This is summarised in the Kittiwake Nesting Success on Artificial Structures³. The results of this study fed into design revisions for the proposed structures and, following extensive consultation with the KCSG, the designs were developed and are discussed in the Detailed Design Report⁴, with final designs agreed by all KCSG members which can be found in the Final Design Drawings⁵.

The nesting structure will be a modular design, enabling individual units to be removed for modification or repair as necessary. Details of the size of each section (and number of nests allowed for) of the wall are provided in Section 5.

Please note, at the time of drafting this KIMP construction of the nesting structures has completed.

3. LOCATION OF COMPENSATION MEASURES

A number of potential locations for the artificial nesting structure have been considered and discussed in detail with the KCSG. However, the location being taken forward is at Lowestoft Port, with a location on the outer port wall near the existing kittiwake nest wall (Figure 1).

² https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010087/EN010087-003008-The%20Norfolk%20Projects%20KIMP%20Annex%202%20Kittiwake%20Structure%20Concept%20Design%20Report%20document_.pdf

³ https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010087/EN010087-003008-The%20Norfolk%20Projects%20KIMP%20Annex%204%20Kittiwake%20Structure%20Detailed%20Design%20Report%20document_.pdf

⁴ https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010087/EN010087-003010-The%20Norfolk%20Projects%20KIMP%20Annex%204%20Kittiwake%20Structure%20Detailed%20Design%20Report%20document_.pdf

⁵ <https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010087/EN010087-003011-The%20Norfolk%20Projects%20KIMP%20Annex%205%20Kittiwake%20Structure%20Final%20Detailed%20Drawings%20document.pdf>

An agreement with the landowner has been entered into as set out in Section 4 and planning permission has also been granted as described below.

Lowestoft Port is considered to be the most suitable location, largely due to its proximity to the sea and accessibility for construction and monitoring purposes. Lowestoft was also considered preferable in large part due to the existing presence of breeding kittiwake in the port and the town. This is expected to result in rapid colonisation of any new structures in Lowestoft. Furthermore, the Lowestoft Port location is adjacent to a wall that was built for kittiwake nesting in the 1990s, but which was abandoned due to high levels of predation by large gulls and foxes (lessons regarding the design of this site and why it failed to provide a long-term nesting site have been included in the current designs). Kittiwake still nest at various locations around the port (see Nesting Success on Artificial Structures Report⁴ and therefore there is clear precedent that the site is suitable.

Planning permission under the Town and Country Planning Act 1990 for the installation and maintenance of the kittiwake nesting structures at the proposed location at the port of Lowestoft was granted on 4 October 2022 (planning reference DC/22/3202/FUL). The application was not considered to constitute an 'EIA development' under the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended) or the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (hereafter referred to as the EIA Regulations) (planning reference DC/22/1347/EIA). The Planning Application and planning decision can be found on the East Suffolk Council website⁶.

4. DETAILS OF LANDOWNER AGREEMENT

East Anglia ONE North and TWO have entered into an agreement for the lease of the site at the Port of Lowestoft (see Figure 1 for lease area).

The land comprises land registered at HM Land Registry with title absolute under title number SK272783, namely Land at Northern Pier Head comprising 1011.71sqm (0.25 acres) (Property).

The Permitted Use under the lease is for the construction, erection, maintenance and use of a structure to accommodate up to 450 kittiwake nests. The number of kittiwake nests to be provided is sufficient to meet the compensation requirements for the East Anglia ONE North and TWO and the Norfolk Projects. Further details on compensation numbers are provided in Section 5.1 and Section 8.

The lease grants East Anglia ONE North and TWO the right to undertake works for the installation, erection and use, and removal of the Kittiwake Compensation Measures, as well as fencing, monitoring and surveillance equipment and any ancillary communications infrastructure. Kittiwake Compensation Measures is defined as the provision of kittiwake nesting structures on the Property suitable for up to 450 nests (in combination with the Norfolk Projects).

East Anglia ONE North and TWO are also granted the right to pass to and from the Property over the roads, designated by the landlord, provided at the Port for dock purposes.

Additionally, East Anglia ONE North and TWO are granted the rights to connect to and use the conduits serving the Property and to lay, install, use, maintain, repair, replace, inspect, upgrade, make connections to decommission and remove conduits for the supply of electricity and telecommunications services to and from the Property in approved locations.

The lease also grants East Anglia ONE North and TWO the right to park two motor vehicles in spaces designated by the Landlord for visitors to the Port.

Lastly, East Anglia ONE North and TWO are granted the right to use an agreed part of the Port during construction of the Kittiwake Compensation Measures as a temporary works compound.

⁶ <https://publicaccess.eastsuffolk.gov.uk/online-applications>

5. ARTIFICIAL NEST STRUCTURE DESIGN

5.1. Scale of Compensation

Collision Risk Modelling (CRM) undertaken for the East Anglia ONE North and TWO DCO applications predicted the annual loss of 0.7 and 0.8 kittiwakes for East Anglia ONE North and TWO respectively. In the Habitats Regulations Assessment (HRA) for East Anglia ONE North and TWO the SoS stated:

“The SoS considers that sufficient information has been provided to give confidence that necessary compensatory measures can be secured that will ensure the overall coherence of the National Site Network for kittiwake. The SoS notes that the Applicant’s proposed compensation package, which includes the provision of artificial nesting structures at Lowestoft and/ or River Tyne, would sit within the second tier of Defra’s hierarchy of compensation measures for the marine environment, i.e., it would address the “same ecological function at a different location” and provide “off-site creation, restoration or relocation of feature that will be harmed/lost”. The SoS also agrees that the recruitment of 0.7 and 0.8 (for East Anglia ONE North and East Anglia TWO, respectively) adult kittiwake into the southern north sea (SNS) population per year would compensate for the effects of the Project.”

To calculate the size of artificial structure required to meet these requirements several factors have been taken into account, as summarised below and in Table 1. The number of nests has been estimated using:

- An assumed survival of 50% chicks to adulthood;
- A compensation colony productivity rate of 1.2 (the average Lowestoft kittiwake productivity, see e.g. Carter 2014, MacArthur Green 2021), an FFC productivity rate of 0.6 (Aitken et al. 2017), leaving a difference of 0.6 chicks per nest available to recruit elsewhere (e.g. FFC) derived following guidance by NE (2020); and
- An overall 3:1 ratio for additional kittiwake capacity, following the approach applied for habitat compensation (as highlighted by NE).

Table 1: Number of kittiwake nests required to compensate for East Anglia ONE North and TWO (note that the proposed compensation has the potential to accommodate up to 432 nests)

Site	Predicted kittiwake loss due to collision	no. chicks required to achieve necessary adults (assuming 50% survive to adults)	Allowance that 0.6 chicks per nest are available to recruit elsewhere	3:1 ratio (required nests)
East Anglia ONE North	0.7	1.4	2.4	7
East Anglia TWO	0.8	1.6	2.7	8
Total	1.5	3.0	5.1	15

As detailed in Table 1, there is a total annual predicted loss of 1.5 kittiwakes due to collision for East Anglia ONE North and TWO (0.7 and 0.8 for East Anglia ONE North and TWO, respectively). The proposed compensation measure has the potential to accommodate up to 432 nests (Section 4). Considering this alongside the calculations presented in Table 1, it is concluded that the proposed compensation measure will provide enough compensation to close out the relevant requirements for East Anglia ONE North and TWO, as outlined in the above SoS statement. The total number of nests is also sufficient to cover the requirements of the Norfolk Projects.

5.2. Evolution of the Nesting Structure Design

Prior to the first KCSG meeting, Vattenfall engaged with Royal Haskoning DHV to develop initial designs for artificial nesting structures for kittiwake. The basis for these “concept designs” drew inspiration from existing successful structures including a bespoke tower located at Gateshead and the Lowestoft harbour kittiwake wall structure (which was initially successful, but subsequently failed due to predation). Two options were

developed, a tower structure and a wall structure. The tower structure has three sides like the successful Gateshead tower and thereby permits nesting on ledges with different aspects. The wall structure was designed with a modular concept so that the length could be readily adjusted to suit the requirements of any particular deployment location. Annex 2 presents the concept designs.

In parallel with the concept design work, MacArthur Green were commissioned to undertake a study of kittiwakes nesting on artificial structures to determine which parameters resulted in success. The study, which is provided in Annex 3, concluded that the following characteristics should be provided for an artificial kittiwake nesting feature:

- Nesting ledges that are between 80 and 150 mm wide, and no more than 200 mm wide.
- Several rows of ledges, designed to reduce risk that birds nesting on lower ledges will be fouled by excrement from ledges above; e.g. by having a stepped structure with the lower ledges recessed relative to the ledges above, or a back wall angled outwards at few degrees from the vertical.
- Sheltered from waves or sea spray during storms.
- Direct access for the birds to the sea would be desirable, but not essential.
- Close to existing colonies if possible, as this would be likely to result in faster colonisation.
- Shelter from direct sun, by selecting north, north-east or north-west-facing sites for artificial ledges, or by providing a large overhanging roof.
- Shelter from crow and large gull access by providing a large overhanging roof, but is also inherent in narrow ledges.
- Shelter from rain, e.g. by providing a large overhanging roof.
- Constructed to minimise risk of predator access (i.e. fox, mink or rat).
- Construction material may be stone, brick, concrete, timber or tyres. Metal may also be suitable, providing the site is sheltered from direct sun to avoid overheating.
- Ledges can be continuous without breaks, but kittiwakes often select nest sites against a side wall, so having stops built into ledges every c. 1.5 m is desirable and may provide additional predator protection.
- Kittiwakes are highly tolerant of human activity and noise around their nests, so sites do not need to be away from human activity and could be compatible with industrial activity. However, noise and mess made by kittiwakes means that sites away from human residential, commercial or business areas would be preferable.
- A spacing allowance of 50cm between nests.

The findings from the MacArthur Green study as well as feedback from the KCSG on the concept design report were used as the basis of design for the detailed design stage (see Annex 4). At this point the designs moved to a “cabinet” based design whereby the nesting ledges were encased in a cabinet (Figure 2). This approach has several advantages. Firstly, it allows for easy removal or replacement of sections of ledges in isolation from the rest of the structure, secondly it increases the amount of stops or book-ends which the MacArthur green report recommended, and thirdly, it increases the modularity of the structures which allows for scaling up or down if required. Another significant change in the detailed design was the tapering of ledges to prevent fouling of nests on lower ledges from those above. Starting at the top of a cabinet with a top ledge width of 200mm the ledges gradually decrease in width to 100mm which accords with the recommendations provided by MacArthur Green.

Through discussions with KCSG members concerns were identified with how the nests would be accessed for monitoring purposes without disturbing the nesting birds, these concerns were addressed for both wall and tower structures by decreasing the size of access doors in the rear of the cabinets so that only two ledges would be accessed from each door. Further discussions on this topic raised concerns that if conducted during windy conditions opening the doors in the back of the wall structure for monitoring could result in the nests being blown off the ledge. These discussions resulted in a structure being added to the rear of the wall to allow sheltered access as shown in Figure 2. Table 2 provides a summary of all the design modifications that were made following consultation with the KCSG.

The detailed designs were presented at the second KCSG meeting, and these were agreed in principle pending further information to be provided on site layout (see Section 5.3 for further detail) and a more thorough review of the detailed design report following the meeting.

Prior to the third KCSG meeting comments were provided on the detailed design which included concerns regarding the fact that on the tower design a central ledge existed between the upper and lower cabinets which

could be accessed by predatory gulls, and the fact that predatory gulls could nest on top of the wall structures. During the third KCSG meeting possible solutions to both of these issues were discussed and it was agreed that modifications would be made to the cabinets of the tower structure (see Table 2, and the minutes from the third KCSG meeting included in Appendix 4 for the KCSG Consultation Report which forms Annex 1 of this KIMP), however the concerns around gulls nesting on the roof structure were allayed through discussion by ornithology experts within the group and therefore this did not result in a change to the designs.

Also, at the third KCSG meeting discussions around the sustainability of the structures and materials used resulted in a redesign of the wall to reduce the amount of concrete within the structure and replace it with steel. With the commitment to make these changes, the designs were agreed by the KCSG and these final agreed designs are provided in Annex 5.

It was agreed with the KCSG at the third meeting that the preferred design to take forward at the Lowestoft location was the wall structure. The final wall structure presented in Figure 2 includes a number of design characteristics which have been developed to improve the chances of success:

- Modular design – to allow for scalability of nesting ledge space.
- Cabinet design of ledges allowing for easy replacement of sections if failure occurs, or modification is required.
- Safe and low disturbance access to nests for monitoring.
- Numerous “book ends” as this appears to be a preference for kittiwakes
- Multiple predator deterrents from aerial and ground threats.
- Security from trespassers (both structures can be locked).
- Sheltered- including tapering ledges
- Constructed from materials which are not prone to overheating and are of a lower Carbon footprint.

In addition, the kittiwake wall structure has the following design features:

- The nesting ledges can be accessed from the rear to allow birds to be caught and fitted with leg rings. Ledge access is via individual small hatches, and these are protected within a secure covered building to the rear, which will minimise disturbance.
- A modular design, with each unit approximately 2.5m long, allowing the structure to be scaled to suit the space available at a deployment location.

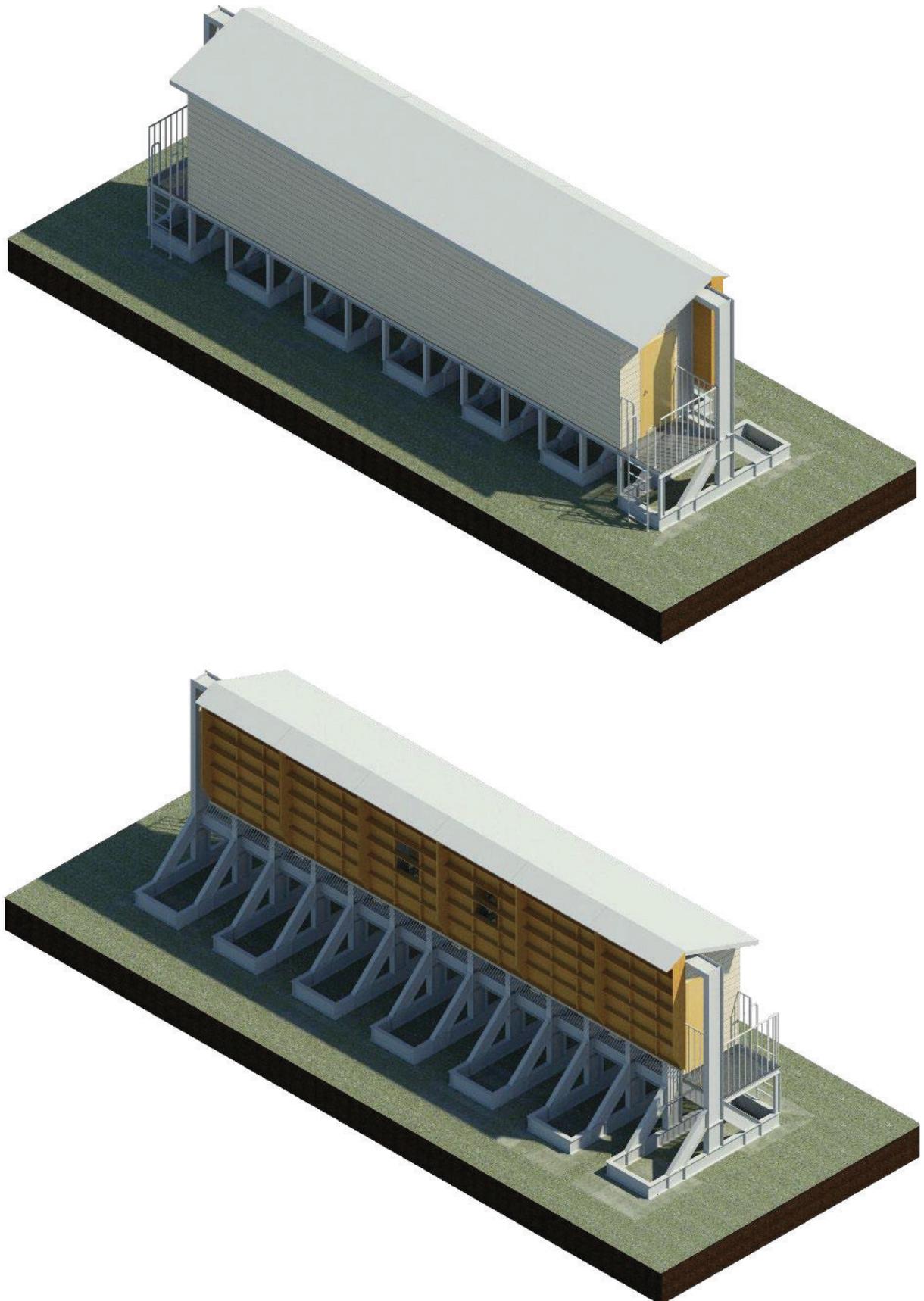


Figure 2: Final wall design (top image is front view, bottom image is rear view)

As discussed above significant collaboration between the KCSG members informed and refined the design of both structures and a summary of this input and the resultant modifications is provided below.

Table 2: Design modifications informed by the KCSG

Comment	Design solution
Wall structure	
The concept designs especially for the wall structure would lead to some disturbance to the nests when hatches are opened for monitoring purposes	The size of the hatches was reduced and the number increased so that only two ledges are serviced by each hatch.
The concept wall design included a mobile scaffolding structure. Concerns were raised that kittiwakes or gulls may try to nest on this structure.	An enclosed sheltered area was added to the rear of the wall structure design. This had the added advantage of removing the concerns regarding disturbance (see line above) especially in windy conditions.
Ledges should be narrow, experience from birds nesting in Lowestoft show that there is a preference for ledges less than 200 mm and as small as 100 mm (birds have been known to nest on narrow window ledges)	This information concurred with the findings of the nesting study and resulted in ledges tapering from 200mm at the top to 100mm at the bottom
Mess from nests on higher ledges could foul nests on lower ledges, this should be prevented if possible	
Site layout and fence design	
Images of the fence surrounding the structures presented at the KCSG meeting indicated that the overhang might trap birds as they try to access the structures	Following consultation with possible suppliers a fence design has been developed which accords with the RSPB guidance on fence design (White & Hirons 2019). Key considerations will be avoidance of barbed wire and use of an appropriate mesh size to avoid the risk of entrapment. Height will be sufficient, in combination with the overhang, to prevent fox access.
Concerns were raised regarding how birds would access the structures within the proposed site locations. This was of particular concern with the wall structures at Lowestoft and less of concern with the tower structures as they have a much smaller footprint.	Three- dimensional models were created to demonstrate distances between the wall structures and other structures surrounding the proposed site location at Lowestoft. The site layout was also designed to provide maximum space between the wall structures whilst remaining within the lease area proposed by the port.

The final agreed detailed design drawings are presented in Annex 5. Other suggestions were made, and possible solutions investigated but not taken forward to the final designs for example, NE raised concerns about predatory gulls nesting on the roof of the wall structure. The design team suggested adding an Apex roof with sloping sides and this solution was presented at KCSG meeting 3. Following further discussions, it was agreed that this modification was not required because, as the RSPB noted, kittiwakes coexist with predatory gulls in Lowestoft (and indeed more widely), and this does not appear to affect the productivity of

the kittiwakes. The Apex solution, therefore, does not form part of the compensation measures, but could be used as an adaptive management measure in future if required (see Section 9).

In summary, two designs were developed in order to ensure flexibility in advance of finalising the location, since different sites would be expected to be more or less suitable for either the wall or tower option. However, the preferred design to take forward at the Lowestoft location is the wall structure.

5.3. Site Layout

5.3.1. Port of Lowestoft

Although the landowner at the port of Lowestoft, the Association of British Ports (ABP), offered a number of potential locations, the most favourable option was on the outer side of the North pier (Figure 4). This location has the best access to open sea and is in a relatively quiet part of the port protected from outside influence by an existing 4m high wall (Figure 3). It should be noted that the area adjacent to this site, on the other side of the 4m wall, is intended to be developed by the Port as part of the Lowestoft Eastern Energy Facility (LEEF) programme.

The plans show that there are to be no works to the section of the North Pier on which the proposed compensation site is located, nor are there any plans for works to the remainder of the North Pier structure (see Figure 3). Construction of offices is proposed, however these are well to the north of the compensation site. To the east of the compensation site, the construction of a bund is proposed, which will require some piling and new access roads are proposed. However, for two reasons these activities are not expected to be detrimental to kittiwake colonisation and breeding on the proposed structures. Firstly, the 4m wall is to be retained and this will provide a barrier to noise and visual disturbance. Secondly, kittiwakes are extremely tolerant of human activity and already nest on numerous buildings and structures throughout the port and Lowestoft town, in close proximity to machinery, vessels, vehicles (including on window ledges along main roads with double-decker bus routes) and people, with no evidence of disturbance.

It was agreed that the wall structure would be the best design to deploy at this location. The main reasons for this are that it would be almost completely screened from view by the existing 4m high wall which would remove any landscape impacts and the fact that a similar kittiwake nesting structure located at the end of the ports' North pier had previously been successful (although it has since fallen out of use, thought to be due to predation and the lack of maintenance).

Once it was determined that a wall structure was most appropriate, optioneering work was undertaken to settle on the best layout. The options considered before arriving at the final agreed layout are as follows:

Option 1

- A single wall parallel to the existing 4m high port wall was considered however this would result in ledges either facing south-southeast or north-northeast. Nests located on the southern side could overheat whilst ledges on the northern side would have less direct access to the sea, as it would be facing directly towards the existing 4m high wall. Therefore, that option was ruled out.

Option 2

- Multiple separate wall structures were then considered as the modular design allows for this level of flexibility. Multiple structures also allow more ledge space for nests to fit into a smaller footprint.
- In order to maximise length of walls that could fit into the space offered by the landowner they would need to be rotated away from parallel to the existing wall.
- If they were rotated further north, the access to the sea would be less immediate. Should they be rotated further to the east there would be a risk of overheating during the morning. In addition to this the eastern end of each wall would then be located too close to the edge of the quay and the risk of structural harm to the existing concrete base could occur during the installation.
- With the orientation chosen the ledges could be placed on the southern side of wall, however that would risk overheating, therefore the northeast orientation was considered the most optimum.
- It would be possible to orientate the three towers north to south (i.e., a mirror image of what is presented) however that would result in exposure to sun until midday.

The final orientation is presented in Figure 5.



Figure 4: Photos of the location at the port of Lowestoft



Figure 3: Location for kittiwake structures at the port of Lowestoft

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During discussions about the proposed site layout at the second KCSG meeting concerns were raised about whether the kittiwakes would be able to access the structures by navigating around and between the walls and other existing structures in the vicinity. To facilitate these discussions a three-dimensional model was created of the proposed site layout, an image from which is provided in Figure 6. The separation distance between the structures will be at least 7.5m at the closest point above ground level. On consideration of this additional information the KCSG agreed that the spacing was suitable.

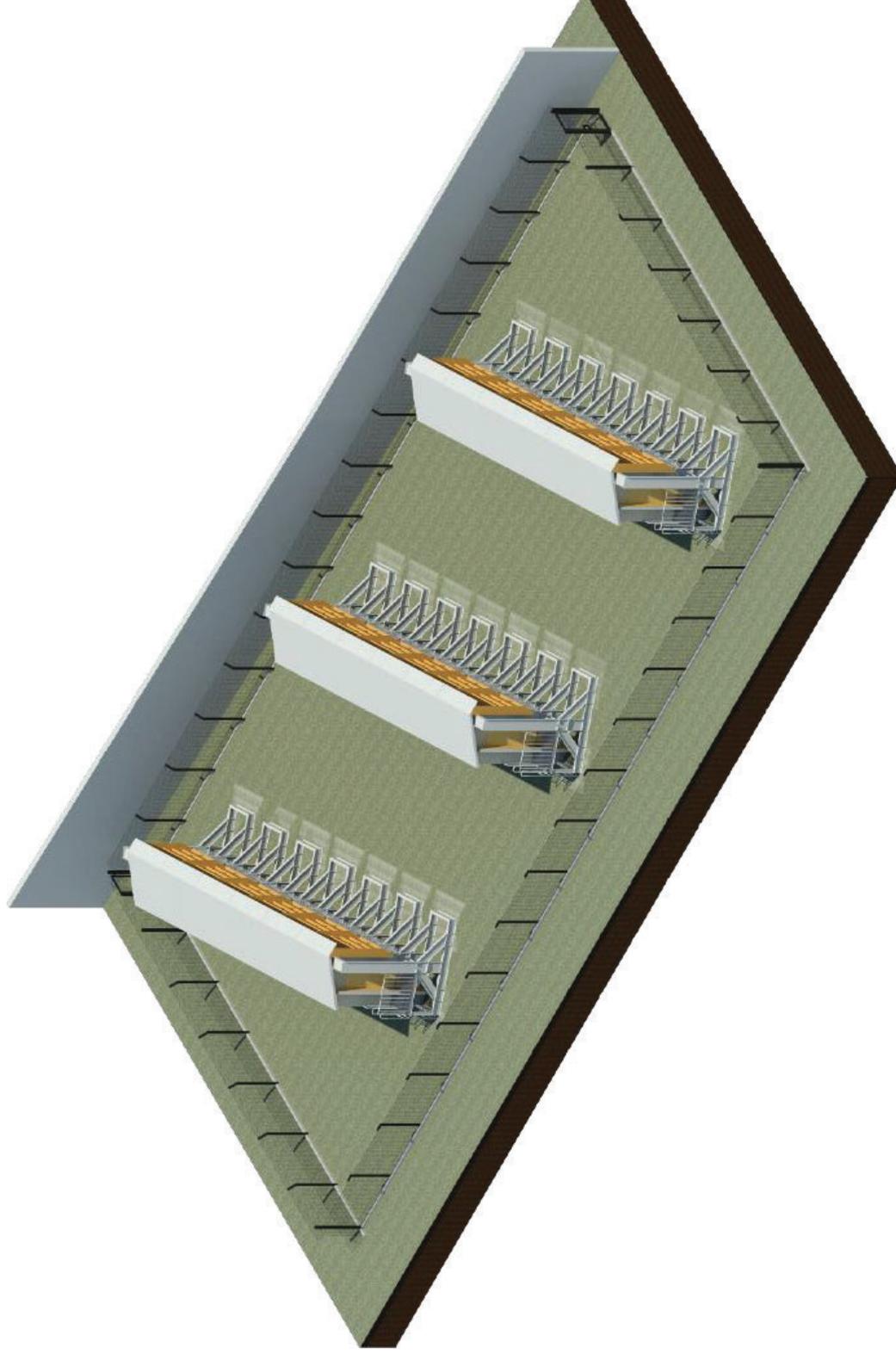


Figure 6: Image from three-dimensional model of the site layout at the port of Lowestoft

5.4. Fence Design

It has been agreed by the KCSG that a predator proof fence should be used to enclose the kittiwake nesting structures in order to prevent access by mammalian predators (e.g., fox) and thereby maximise reproductive success. The fence is also likely to reduce human disturbance to the nesting birds, although neither port site has public access so this risk should be minimal. The proposed fence layouts are illustrated in Figure 5 and Figure 6. The specification of the fence will adhere to the guidance provided in the RSPB manual on the Predator Exclusion Fence design (White & Hirons 2019) and will:

- Have a height of 1.8m;
- Have a mesh size of 5 x 10cm;
- Be topped with a 45° angled overhang c. 60cm (smooth material or floppy mesh) to the outside;
- Have a narrow skirt pinned at the base to the existing concrete using tamper proof bolts;
- Have a wire with minimum gauge of 1mm;
- Have a design life of at least 35 years (with regular maintenance) and be maintained or replaced as necessary for the duration of the compensation; and
- Be constructed with particular care to ensure that potential weak points (corners and gates) are well installed with minimal gaps.

6. DELIVERY TIMETABLE

Commissioning of the kittiwake structures was completed in February 2023. This has been completed prior to the start of the 2023 breeding season therefore allowing a minimum of four breeding seasons (defined as 1 March-30 September, as per the DCO, see below) before the proposed first operation of turbines within the East Anglia ONE North and TWO Projects.

Condition 5 of the compensation schedules states that:

“no operation of any turbine forming part of the authorised development may begin until four full breeding seasons following the implementation of the measures set out in the KIMP have elapsed. For the purposes of this paragraph each breeding season is assumed to have commenced on 1 March in each year and ended on 30 September”.

7. MAINTENANCE SCHEDULE

It will be important that the nest structure is maintained in a sound state so that it continues to provide a safe and effective structure for kittiwake breeding. To ensure this there will be regular inspections by a qualified engineer and ornithologist to ensure the needs of the birds are met and that the structure is safe for ornithologists engaged in monitoring studies. These inspections will primarily be conducted during the nonbreeding season in order to avoid unnecessary disturbance (kittiwakes are only in attendance at their nesting sites from late February to August).

An initial inspection will be conducted in September each year to identify any works required and to schedule these in at appropriate times. As well as a post-breeding inspection to allow any major works to be undertaken in advance of the following season, remote inspection (e.g. using binoculars) will also be performed during the breeding season in case any emergency repairs are required. There will also be a pre-season check conducted in January to ensure the site is in good condition immediately prior to bird arrivals. This will be conducted to allow sufficient time for all necessary repairs to be completed. It may also be necessary to undertake checks following severe weather.

Pre-breeding season inspections will also ensure that the nest access doors and panels are all operational.

Repair work during the breeding season will only be conducted if it is considered essential due to the high degree of disturbance this would cause, and the risk of egg and chick loss to predatory gulls. Due to the modular nature of the structures repair work can be isolated to small sections of the structures.

Due to the current (2022) outbreak of highly pathogenic avian influenza (HPAI) in the UK it may also be appropriate to attempt to disinfect the nesting ledges between breeding seasons. Should this be considered necessary, and it can be undertaken without acting against the aims of the compensation (for example nest removal over winter may reduce the likelihood of pairs from returning in the following breeding season) then statutory advice and guidance on such matters would be followed.

Similarly, it may be necessary to remove the carcasses of kittiwakes suspected of dying from HPAI. This will be undertaken following the statutory guidance on safe removal.

8. ARTIFICIAL NEST SITE, NATE DISPERSAL AND COLONY INTERCHANGE MONITORING AND REPORTING

8.1. Overview

The following section describes the details of the monitoring proposal for the kittiwake compensation as agreed via the KCSG. Whilst a collaborative approach between Vattenfall and ScottishPower Renewables is being pursued, it is important to be cognisant of the fact that East Anglia ONE North and TWO and Norfolk Projects are independent commercial entities and have their own individual consents. Therefore, in the very unlikely event that a collaborative approach cannot be delivered (and noting that there is no indication of such an outcome at the time of writing), ScottishPower Renewables would seek to discuss a proportionate monitoring approach that suitably reflects the level of compensation East Anglia ONE North and TWO are required to deliver.

8.2. Kittiwake Compensation Monitoring Approach

The kittiwake compensation has been developed with the aim of providing additional replacement breeding age birds into the southern North Sea population (from which birds at the FFC SPA are recruited), to replace the predicted potential loss of 1.5 adults per year from the FFC SPA population (0.7 for East Anglia ONE North and 0.8 for East Anglia TWO). As it is not feasible to directly monitor all recruitment to the FFC SPA population (due to its large size and inaccessibility) it will be necessary instead to monitor other aspects of both the compensation population and other kittiwake populations in the region from which the performance of the compensation measures will be inferred. For the purposes of the monitoring 'regional' is defined as within 100km of the compensation population (this is the distance that most birds recruit within). This comprises, to the north the Norfolk coast as far as Scolt Head and to the south, all of the Suffolk coast and part of the Essex coast as far as Clacton-on-Sea.

A core monitoring approach (as outlined below) is the minimum monitoring requirements to track the performance of the compensation, and will be undertaken in all years while the nesting structures remain commissioned (unless otherwise agreed with the KCSG and SoS). As such, monitoring and adaptive management will continue throughout the life time of the nesting structure. Additional monitoring is planned for the first three years after the nesting structures are commissioned (with the potential for extension) and will collect wider evidence to assist with understanding the performance of the population. Since the additional monitoring has been drawn up prior to the compensation commencing it should not be considered as exhaustive, since other studies may be identified as being more appropriate or informative, depending on observations of the colony. It should also be noted that methods which involve catching birds (e.g., for fitting leg rings) are expected to be subject to restrictions caused by the presence of HPAI in seabird populations, so may not be feasible at least initially.

The following will form the core monitoring, undertaken annually commencing in the first breeding season following installation of the structures:

- Counts of the number of pairs (apparently occupied nests (AON)) and productivity, backed up with photographs to enable the fate of individual nests to be tracked (remotely controlled cameras may also be installed to permit more intensive monitoring with minimal disturbance). In the first year of monitoring (2023), counts of AON, eggs and chicks will be made every two weeks between March and August (10 counts in total). Following review of the results, and in discussion with the KCSG, this may be reduced (e.g. monthly).
- Chicks will be ringed with British Trust for Ornithology (BTO) and colour rings for the first 10 years of monitoring (2023-2032; with possible extension, subject to discussion with the KCSG), adults will be ringed with BTO and colour rings until year 5 of the monitoring (with possible extension, subject to discussion with the KCSG). In both cases the work will be undertaken by suitably trained, qualified and experienced seabird researchers, and only if there are no welfare or HPAI concerns.

In the first three years following initiation of the compensation the following additional monitoring will be undertaken (with possible extensions dependent on results obtained):

- Consideration of any relationships between nest position (on the structure(s)) and breeding success;
- Diet studies of compensation population, through collection of pellets and/or regurgitated material during handling of birds for ringing (note this aspect will be opportunistic and it is not proposed that efforts to force regurgitation will be made);
- Estimation of the regional population size (AON at accessible/visible locations within 100 km, focus will be onshore locations and efforts to survey offshore structures are not being proposed). Where possible counts will be made by visual observation and backed up with photographs to provide a permanent record and to facilitate comparisons across years (note this is expected to primarily comprise Lowestoft, however other areas along the East Anglian coast will be kept under review for monitoring should either surveys or contact with local bird groups etc. indicate the presence of breeding kittiwakes);
- Productivity of regional population (no. fledged/pair), derived from a sample of locations from the regional population since it is not considered feasible to monitor the entire regional population. This will be based on a minimum of three visits to the sample sites during the breeding season (May/June/July);
- Ring resighting campaigns. For adults this will be combined with the regional population counts and productivity sampling (above), with the aim of identifying any movement of adults from the compensation population to other urban and natural locations (i.e. to investigate if the new structure attracts recruits to the location which subsequently move into other urban locations where they may come into conflict with people). For juveniles this will focus on identifying recruitment locations for individuals hatched at the compensation colony, therefore the focus for this will commence four years after the first chicks are ringed. It is intended this will be coordinated with other kittiwake research, particularly at FFC SPA, and will include proportionate contributions from the East Anglia ONE North and TWO to support existing ringing work of relevance to the compensation;
- Ringing (BTO and colour rings) of chicks produced at other regional populations may also be undertaken, at a sample of locations where such work is considered feasible (a survey to investigate opportunities for such work will be planned for summer 2023). This may permit the origins of ringed birds which recruit to the compensation population to be determined; and
- Adult birds in the compensation population may be fitted with GPS tags to enable understanding of

their breeding season foraging behaviour (distances, locations, etc.). However, this will only be conducted if it is considered to provide important data, due to the need to balance the knowledge gained with the welfare aspects associated with such studies.

It is hoped that much of the above monitoring will be conducted collaboratively by Vattenfall, with other interested parties, such as developers providing similar compensation, seabird researchers and other seabird interest groups. This will minimise the risk of duplication of effort and unnecessary disturbance to breeding birds.

8.3. Timescales for Reporting

Following each year of monitoring, at least one KCSG meeting will be organised to present the findings and discuss how these will be reported. In accordance with Schedule 18, Part 1 Paragraphs 3 (f) and 7 of the East Anglia ONE North and TWO DCOs an annual report will be produced and provided to the KCSG and SoS as soon as practical each year. The anticipated stages for producing the annual reports are provided in Figure 7.

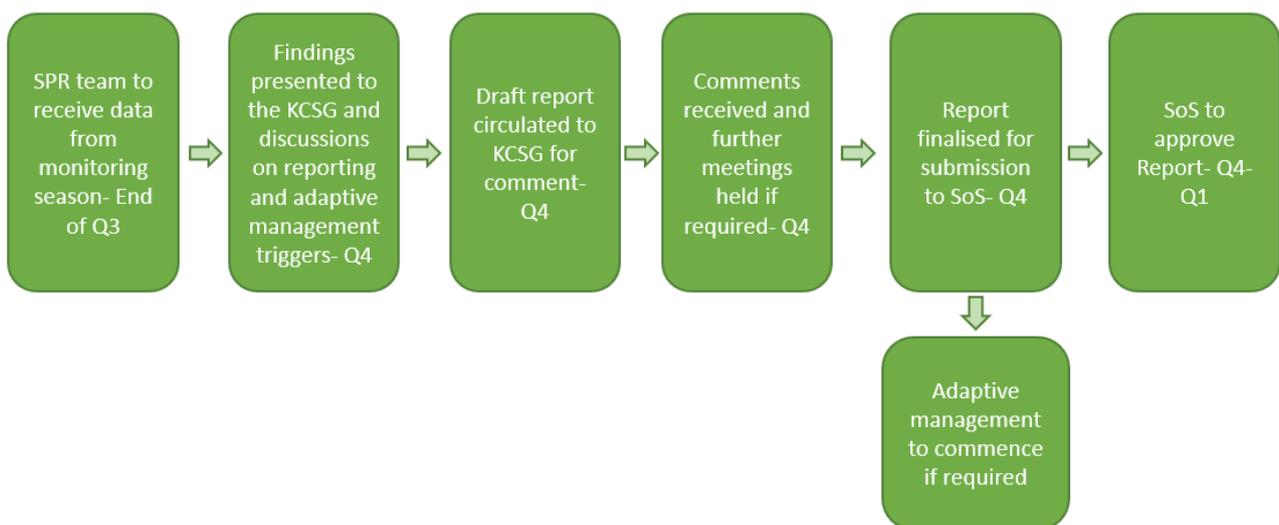
Figure 7: Annual reporting to the SoS

9. COMPENSATION PERFORMANCE AND MONITORING ADAPTIVE MANAGEMENT

Schedule 18 Paragraph 7 of the East Anglia ONE North and TWO DCOs states that for the annual reporting:

'Results from the monitoring scheme must be submitted at least annually to the Secretary of State and the relevant statutory nature conservation body. This must include details of any finding that the measures have been ineffective in securing an increase in the number of adult kittiwakes available to recruit to the SPA and, in such case, proposals to address this. Any proposals to address effectiveness must thereafter be implemented by the undertaker as approved in writing by the Secretary of State in consultation with the relevant statutory nature conservation body.'

On the advice of NE, an expert group was convened on the 6th October 2022, to consider how to monitor the success of the compensation. The expert group was attended by representatives from the UK Centre for Ecology and Hydrology (UKCEH) and the RSPB (NE did not have capacity to attend). It was agreed through discussion in this group that, while productivity was the ultimate measure of success, it was critical that the reasons for any shortfall were recorded in order that appropriate remedial steps (if warranted) could be taken.



Thus, while it was agreed that it was sensible to set targets for colony performance these metrics should be used as a framework for monitoring and that it is just as important that consideration is given to an understanding of the status of kittiwake colonies more widely, in order to determine the compensation colony's relative performance.

Thus, the performance of the new colony should not be viewed in isolation but should be seen in the wider context of kittiwake breeding success locally (i.e. Lowestoft) and regionally (e.g. southern North Sea). Hence, poor breeding success at the compensation colony in a year when this is also seen at most other kittiwake colonies locally or regionally would be indicative of wider issues (e.g. reduced prey stocks or adverse weather conditions) and would not automatically trigger remedial action at the compensation colony. However, under these circumstances the East Anglia ONE North and TWO Projects, in collaboration with the Norfolk Projects, would look to understand the reasons for poor reproductive performance at the compensation colony, attempt to identify potential remedies and collaborate with relevant groups to understand the wider context in terms of other local or regional colony breeding success.

Conversely, if the compensation colony performs less well than other monitored sites, this would be a strong indicator that action is required to identify and address the causes.

During the initial years following installation of the nesting structures (e.g. years one to five), monitoring is expected to be focussed on understanding the mechanisms for colonisation. For example, there may evidence that birds are not prospecting at the new structure, or prospecting but not settling, or settling but abandoning during nest building, etc. and each of these would lead to a requirement for different remedial measures. Data will be collected with the aim of understanding the reasons for whichever of these may be occurring, such as the suitability of the nesting ledges or protection from weather and predators and the most appropriate corresponding responses. Other factors which will be monitored will include nest attendance rates and foraging trip duration, as these will indicate the degree of effort required by the breeding adults and may indicate reasons for reproductive failure. As noted above, it will also be necessary to conduct similar monitoring at a sample of other locations to understand if any observed patterns are replicated elsewhere.

If colonisation does occur in the initial years (i.e., years one to five following construction of the nest structures) and initial recruits have good breeding success, but the rate of colony growth appears to be lower than would be needed for the colony to reach capacity within five years then reasons for this will be investigated. This may highlight avoidance of particular areas of the structures (e.g., more exposed, further from the sea, etc.), which could be targeted for modification or highlight that additional effort in attracting birds would be beneficial (e.g., use of decoys and broadcasting colony calls).

The monitoring and requirements for adaptive management will be conducted on an annual basis at least until such time as it is agreed that the colony is self-sustaining and performing at least as well as other local colonies.

As discussed above, the adaptive management measures to be considered will depend on the circumstances, however actions may include:

- Encouragements to attract and accelerate recruitment through use of colony playback, placement of old kittiwake nests on shelves and installation of decoy birds;
- Structural modifications to improve suitability (e.g. addition of vertical baffles, change in ledge width, increased weather or predator protection, etc.);
- If productivity (per pair) appears to be lower than would be expected then the causes will be investigated and options such as supplementary feeding explored (note however this option would require careful consideration to rule out other more systemic causes, such as collapse of prey stocks, that short-term feeding would be unable to make up for); and,
- Provision of nesting material (if this appears to be limiting).

If there appear to be problems caused by the structures themselves, these will be addressed through targeted modifications, extension, orientation, increased weather protection, improved predator protection and/or disturbance prevention. For example, should the presence of predatory gulls nesting on the roof of the structures be linked with a reduction in productivity the option to add a more steeply pitched roof, or other suitable deterrent, could be implemented (see Section 5 for further detail).

As a final consideration, alternative locations which may accommodate alternative structure designs (such as the tower design set out in Annex 5) will be considered.

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