RWE Renewables UK Dogger Bank South (West) Limited

RWE Renewables UK Dogger Bank South (East) Limited

Dogger Bank South Offshore Wind Farms

Habitats Regulations Derogation: Provision of Evidence

Volume 6

Round 4 Kittiwake Strategic Compensation Plan

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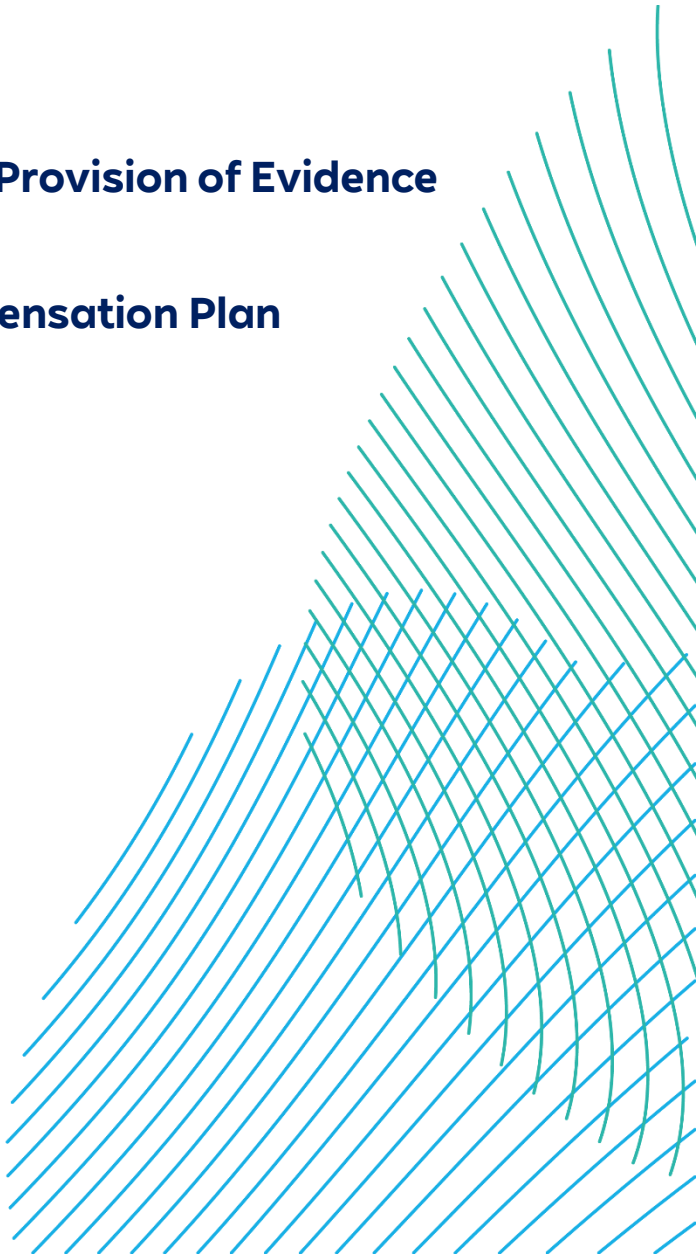

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Offshore Wind Leasing Round 4

THE CROWN ESTATE | NIRAS

Offshore Wind Leasing Round 4

Kittiwake Strategic Compensation Plan

The Crown Estate

Date: 5th February 2024

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1	1/9/23	First draft	FRCA	TNO	SPAC
1.1	27/9/2023	Second draft	FRCA	SPAC	SPAC
1.2	06/11/23	Updated following SG & EWG call	FRCA	SPAC	SPAC
1.3	08/12/23	Updated following TCE & TL review	FRCA	TNO	SPAC
1.4	19/12/23	Updated following TCE & TL review	FRCA	SPAC	SPAC
1.5	22/01/24	Updated following TL review & SG call	FRCA	TNO	SPAC
1.6	24/01/24	Updated to include details of SGDM10, SGDM11 meetings & Comments from Jake Laws	FRCA	SPAC	SPAC
1.7	05/02/24	Updated following Defra announcement & inclusion of agreement log	MCLA	SPAC	SPAC

Contents

1 Introduction

1.1.1 The Crown Estate adopted the Offshore Wind Leasing Round 4 Plan ("Round 4" or "the Plan") in January 2023 with the objective of generating between 7 to 8.5 GW of additional offshore wind farm capacity. The Crown Estate is in the process of delivery the commitments made in the Round 4 HRA and associated derogation case, and the obligations placed upon it by the Secretary of State in his approval of the derogation case on 15th July 2022.

1.1.2 As a competent authority, The Crown Estate was required to undertake a plan level Habitats Regulations Assessment (the "Round 4 Plan Level HRA") to meet its obligations under the Conservation of Habitats and Species Regulations 2017 (as amended), and the Conservation of Offshore Habitats and Species Regulations 2017 (as amended) (collectively referred to as the "Habitats Regulations" within this document). The Crown Estate adopted the Plan following the Secretary of State's approval of the derogation case and subsequently entered into Agreements for Lease for the six projects comprised in Round 4.

1.1.3 NIRAS Group (UK) ("NIRAS") was commissioned as technical adviser to The Crown Estate on the Round 4 Plan Level HRA. In this capacity, NIRAS also completed the Report to Inform Appropriate Assessment ("RIAA") (NIRAS, 2021). The RIAA recommended that The Crown Estate's "Appropriate Assessment" (The Crown Estate, 2022) conclude that the Round 4 Plan alone and in-combination will not have an adverse effect on site integrity ("AEOSI") of the majority of Protected Sites[1] considered. However, in the case of Annex I sandbanks slightly covered by seawater all of the time as a feature of Dogger Bank Special Area of Conservation ("SAC") and black-legged kittiwake *Rissa tridactyla* (hereafter kittiwake) as a feature of Flamborough and Filey Coast ("FFC") Special Protection Area ("SPA"), it was not possible to recommend a finding of no AEOSI, in view of the impacts assessed for those sites.

1.1.4 This report focuses on kittiwake at FFC SPA and three Round 4 projects which contribute towards the conclusion of AEOSI for this Protected Site: Dogger Bank South West ("DBSW"), Dogger Bank South East ("DBSE") and Outer Dowsing Offshore Wind ("ODOW") in Figure 1.1.

[1] In accordance with the Habitat Regulations, Protected Sites include European sites and European offshore marine sites which comprise the following designations: Special Areas of Conservation ("SAC"), candidate SAC ("cSAC"), Special Protection Areas ("SPA"), potential SPA ("pSPA") and Sites of Community importance ("SCI"). As a matter of government policy, Ramsar sites (designated under the Convention on Wetlands of International Importance) are also treated as Protected Sites, as are areas secured as sites compensating for damage to a Protected Site. This list aligns with recent HRA guidance published by DEFRA (DEFRA 2021).

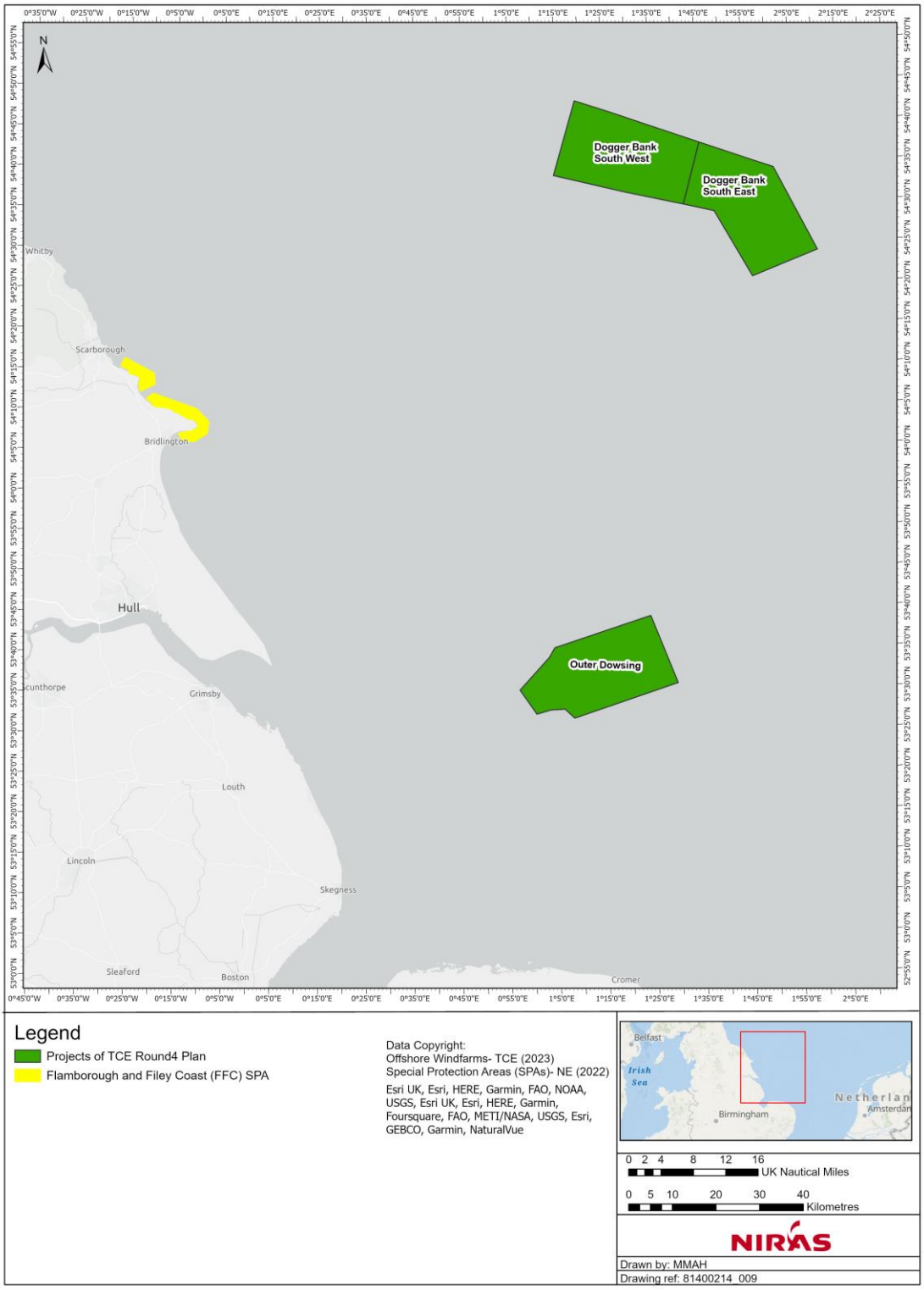

Figure 1.1 Flamborough and Filey Coast SPA in relation to the three relevant Round 4 projects

1.1.5 Based on this recommendation, The Crown Estate's Appropriate Assessment concluded that an AEOSI of the breeding kittiwake feature of the FFC SPA could not be excluded due to the effects of the Round 4 plan and specifically the three Round 4 projects shown in Figure 2.1 in-combination with other plans and projects. Although mitigation was identified and was secured through conditions in the Agreements for Lease with the Round 4 developers, to reduce the effects of Round 4, this was not considered sufficient to avoid an adverse effect in light of the site's unfavourable status with respect to kittiwake. Under the derogation provisions of the Habitats Regulations, the Round 4 plan can still go ahead notwithstanding a finding that there will or could be an AEOSI of a Protected Site. This only applies where: (a) there is no alternative solution which would be less damaging or avoid damage to the Protected Site(s); (b) there are imperative reasons of overriding public interest ("IROPI") to proceed with the Round 4 plan; and (c) any necessary compensatory measures can be secured (to ensure the overall coherence of the UK National Site Network).

1.1.6 A "Derogation Case" in support of the Round 4 plan was produced alongside the Appropriate Assessment (Chapter 8 of The Crown Estate, 2022). This demonstrated that there were no feasible alternative solutions to the Round 4 plan which would meet the Round 4 objectives and be less damaging or avoid damage to the FFC SPA, there were clear IROPI to proceed and that a robust framework for the delivery of the necessary compensatory measures to offset the adverse effect would be secured. These compensatory measures only apply to DBSW, DBSE and ODOW which the Round 4 Plan Level HRA identified as a source of potential additional kittiwake mortality associated with the FFC SPA.

1.1.7 The Crown Estate's Derogation Case included a commitment to develop a Kittiwake Strategic Compensation Plan ("KSCP", this document) which must be adhered to by DBSW, DBSE and ODOW through their agreement for lease conditions. The overall objective of this KSCP is to detail the development and delivery of strategic compensation to ensure the overall coherence of the UK National Site Network in relation to kittiwake by identifying suitable measures, providing a pathway to those measures and in turn providing assurance that compensation will be delivered for the impact on kittiwake, subject to refinement during the project level HRA process which is required as a matter of law. Strategic compensation for the purposes of Round 4 is defined here as compensatory measures delivered collectively to address the AEOSI of the FFC SPA from the Plan.

1.1.8 This document sets out the KSCP associated with the FFC SPA providing a framework to determine the scale and location of proposed strategic compensation measures for the effects on kittiwake and how these can be secured, delivered, monitored and adapted. This KSCP reflects the ecological preference of potential compensation measures but includes different options to address the potential delivery issues relevant to some measures identified below.

1.1.9 Further details on the precise delivery method for the measures would be provided in a Kittiwake Strategic Implementation and Monitoring Plan ("KSIMP") submitted to the Secretary of State at the Department for Energy Security and Net Zero ("DESNZ") prior to the operation of any wind turbine generator of DBSW, DBSE and ODOW. The KSIMP would be required to be approved by the Secretary of State (DESNZ) in consultation with the Marine Management Organisation ("MMO") and/or local planning authority and Natural England ("NE") as the relevant Statutory Nature Conservation Body

("SNCB"). An outline version of the KSIMP (which details its proposed content) is presented in Appendix A.

1.2 Secretary of State Letter of Acceptance

1.2.1 On the 15th July 2022, the Secretary of State for Business, Energy & Industrial Strategy ("BEIS") issued a letter of acceptance of The Crown Estate's Notice of Derogation (Appendix B) and stipulated a number of key factors which must be attained by the Round 4 compensation required as a result of the Plan, and obligated The Crown Estate to comply with the commitments made within its derogation case.

1.2.2 Of particular note is the Secretary of State for BEIS' request that *"agreement of the compensation plan within each steering group is required before submission of DCO applications*". This has been achieved by the steering group established for the KSCP (see Section 2) and is demonstrated within the Agreement Log (see Section 4 and Appendix C). The letter of acceptance (Appendix B) also outlined the importance of monitoring and adaptive management associated with the Round 4 compensatory measures. These aspects are considered in detail in Section 12and Section 13respectively.

1.2.3 The overall aim of this document is therefore to demonstrate that the following compensatory measures can be implemented, with confidence, to function effectively and offset the potential impact caused to FFC SPA as a result of the three Round 4 projects described above.

2 Steering Group Engagement Process

2.1.1 A Round 4 strategic steering group for kittiwake compensation (hereafter referred to as the "Steering Group") was formed by The Crown Estate in accordance with agreed Terms of Reference. The Steering Group has overseen the development of this KSCP.

2.1.2 The Steering Group consists of a nominated representative from the following:

- The Crown Estate, with NIRAS as its technical advisor;
- Natural England ("NE");
- Joint Nature Conservation Committee ("JNCC");
- Department for Food, Environment & Rural Affairs ("DEFRA");
- DESNZ;
- Developer of DBSW and DBSE – RWE Renewables;
- Developer of ODOW – Corio Generation, Total Energies, Gulf Energy Development.

2.1.3 Meetings have also been attended by the Offshore Wind Industry Council ("OWIC") as a guest, in an observation capacity, to tie in with their parallel work on strategic compensation through the Collaboration on Offshore Wind Strategic Compensation (COWSC) workstreams.

2.1.4 Steering Group meetings have been held in a hybrid manner (with attendees in person and via Microsoft Teams). Meetings have been approximately three hours in duration and held once every two months as a minimum (but closer to once every month on average) from December 2022 while

this KSCP has been being developed and will be ongoing at least quarterly throughout the year and otherwise as frequently as monitoring reports are received and at such appropriate frequency throughout the delivery of the relevant compensatory measures. Meetings have been and will continue to be chaired by The Crown Estate and facilitated by NIRAS as technical specialists in ornithology and compensation. Meeting minutes have been and will continue to be captured, along with the use of an Agreement Log (see Section 4 and Appendix C) which outlines key areas of Steering Group agreement and disagreement, to assist the Secretary of State DESNZ in determining the acceptability of the compensation proposed within this KSCP at the project consenting stage. Agreement between the Steering Group is highlighted within the relevant sections of this report to convey the collective efforts of the Steering Group in formulating this KSCP. A breakdown of meetings and key areas of discussion is presented in Table 2.1.

Table 2.1 Overview of Round 4 Plan strategic compensation Steering Group meetings

Meeting #	**Meeting date**	**Main areas of Steering Group discussion**
1	9th December 2022	• Recap of Round 4 compensation to date including details of the derogation case and potential measures that have been identified • Discuss/ determine potential options • Identify evidence gaps • Work towards solutions
2	3rd March 2023	• Develop agreed compensatory measures in terms of: • Scale & Ratio • Timing and duration • Delivery mechanism • Monitoring • Adaptive management • Success criteria
3	28th March 2023	• Strategic Compensation Roadmap • Agreement of compensation approach for Round 4 • Delivery mechanism • Adaptive management • Kittiwake Meta-population Understanding
4	25th April 2023	• Approaches to deriving quantum • Application of compensation ratios • Site selection criteria • Delivery mechanism
5	24th May 2023	• Determination of scale • Site selection • Strategic artificial nesting structure (SANS) design and monitoring
6	21st June 2023	• Agree compensation population • Next steps for SANS design • Site selection • Update on fisheries • Monitoring considerations

		• Supporting measures
7	2nd August 2023	• Recap on compensation quantum discussions • Areas of agreement – what hurdles still remain? • Approaches to delivery of kittiwake compensation – working strategically • KSCP – outline proposal • Site selection update
8	30th August 2023	• Site selection – additional considerations • Composition of compensation package • Approaches to delivery of kittiwake compensation • Monitoring considerations • Adaptive management – trigger points and potential management options • DTA advice and its application to Round 4 strategic compensation
9	1st November 2023	• Focused on reviewing key comments to address from the SG / EWG review of the Plan • Update on Ørsted's response to sharing a SANS
10	16th Novem-ber 2023	• Further update from Ørsted on SANS sharing • Focused discussion on where there were still points of disagreement withing the SG: Method used to calculate compensation and population, application of the compensation ratio & number of breeding seasons required before implementation
11	12th January 2024	• Ørsted presented an update on SANS sharing with Hornsea 4 • Updates were given on: nesting spaces available to Round 4 developers, size of the proposed structure & timescales • Discussion then focused on the methods used to calculate the quantum & how they should be presented in the plan. Due to NE & JNCC not being present on the call this discussion was brief and a follow-up meeting was booked
12	18th January 2024	• Discussion focused on the methods used to calculate the quantum & how they should be presented in the plan. • It was decided that the upper and lower limits of the quantum envelope should be based on the practical number of nesting spaces from the SANS design presented by Ørsted

2.1.5 Engagement with the HRA Expert Working Group ("EWG"), which supported The Crown Estate with the Round 4 HRA process has also been undertaken. The EWG has been provided with written updates following each Steering Group meeting including a summary of the discussion and high level programme, a verbal update at a workshop held on 7th June 2023, bi-lateral meetings as requested by Steering Group members and a draft of this KSCP for review. The role of the EWG (in relation to the KSCP) is to offer advice to the Steering Group on the process of determining compensation and recommendations on outcomes. The EWG consists of the following organisations:

- NE;

- JNCC;
- DEFRA;
- DESNZ;
- Natural Resources Wales;
- NatureScot;
- Marine Scotland;
- Department of Agriculture, Environment and Rural Affairs of Northern Ireland ("DAERA");
- MMO;
- The Wildlife Trusts;
- Royal Society for the Protection of Birds ("RSPB"); and
- Whale and Dolphin Conservation.

3 Development of Strategic Compensation Measures

3.1.1 The method adopted by the Round 4 plan to identify potential compensatory measures and evaluate their appropriateness at a strategic level was undertaken via the Round 4: Technical Compensation Note (NIRAS, 2022), which determined the following shortlist of compensation options for kittiwake in support of The Crown Estate's Appropriate Assessment:

- Onshore or offshore artificial nesting structure(s);
- Management of fisheries to increase prey availability; and
- Other enhancement measures to increase prey availability.

3.1.2 In order to ensure an administrative and evidence-based pathway to compensatory measure selection, which accounts for new or novel methods, it was important for the Steering Group to take account of other potential compensatory measures for kittiwake. This included those proposed by other OWF proposals (such as Hornsea Project Three, Norfolk Vanguard, Norfolk Boreas, East Anglia TWO/ONE North, and Hornsea Project Four). This includes projects that have been deemed suitable having been through the Development Consent Order ("DCO") examination process and DCOs subsequently having been granted. Additionally, the process suggested other options, some of which were new and untested, while the Steering Group also stayed abreast of strategic compensation measures work undertaken by the Collaboration on Offshore Wind Strategic Compensation[2] group to determine whether measures would be applicable to the Round 4 plan.

3.1.3 The list of potential compensatory measures were then advanced via a comprehensive scoring process (see Table 3.1 below) which uses compensation criteria based on DEFRA's Best practice guidance for developing compensatory measures in relation to Marine Protected Areas (Consultation Draft – DEFRA, 2021).

[2] Collaboration on Offshore Wind Strategic Compensation (COWSC) brings together industry, environmental NGOS, SNCBs, the UK Government and Devolved administrations and other relevant stakeholders with the purpose of finding strategic compensation solutions that enable the required build out of offshore wind, while offsetting impacts to marine ecosystems.

Table 3.1 Overview of criteria used to refine longlist of potential strategic compensation measures for kittiwake

Criterion	**Description**
Preference Hierarchy	DEFRA (2021) sets out a preference hierarchy which considers compensatory measures on a spectrum from 'like for like' measures through to population and regional-based measures that focus on the provision of similar or wider environmental benefits. Moving along this spectrum will be dependent on the impact of the development and the achievement of the best outcomes for the marine environment. However, the underlying principle is that compensatory measures need to benefit the same feature which is impacted by the development to recompense the damage, where it is feasible. Measures which target the feature of the Protected Site will gain higher points for this criterion.
Location	Compensatory measures should be in a location where they will be most effective at maintaining the overall coherence of the UK National Site Network. Delivery of compensation at the impacted location (i.e., the relevant SPA) should be deemed as the most effective compensation and will score higher for this criterion.
Technically feasible	The compensatory measure must be technically feasible with a consideration of delivery at a strategic level to enable its implementation. This decision should be based on evidence with recognition of challenges to implementation. Measures which are backed by evidence and have limited barriers to delivery will gain higher points for this criterion.
Timing	The feature should not be impacted before compensation is secured. Ideally, compensation should be in place, functioning and contributing to the coherence of the national site network before any impact occurs. It is recognised that this cannot always be possible, and therefore consideration of mortality debt and surplus should be included in planning. Higher scores are awarded to measures with higher certainty associated with their timelines.
Additionality	Compensation must be additional to the normal practices required for the protection and management of the Protected Site. Measures should provide additional benefit. Therefore, any measure that will be undertaken by Government bodies to ensure that the site is in favourable conservation status or that protected features are in favourable condition, should not be considered as compensation.
Scale	Compensatory measures must address the impact of the activity in comparable proportions depending on issues such as certainty of success, time for recovery or distance from the area of loss. Given the lack of evidence to date surrounding success of marine compensation, measures should be delivered at a ratio higher than 1:1.

3.1.1 The Steering Group agreed on both the criteria used to rank compensatory measures and the overall approach of identifying strategic compensation for Round 4. Table 3.2 provides a description of the measures considered during the process and rationale as to whether they were explored further by the Steering Group. Those rows highlighted green are describe the measures included in this plan.

Table 3.2 Strategic compensation measures considered by the Steering Group

Measure	**Description**	**Rationale for taking forward/ discounting**
Onshore artificial nesting	The provision of artificial nesting platforms at coastal locations.	Steering Group agreed the measure had merit and was therefore taken forward for further consideration.
Offshore artificial nesting	The provision of artificial nesting platforms at offshore locations.	Steering Group agreed the measure had merit and was therefore taken forward for further consideration.
Management of fisheries to increase prey availability	Reducing fishing pressure on prey species, such as sandeel, through restrictions.	Steering Group agreed the measure had merit and was therefore taken forward for further consideration.
Habitat creation to increase prey availability	The creation of habitat with ecosystem services (e.g. sea grass restoration to increase small forage fish)	Steering Group agreed the measure had merit and was therefore taken forward for further consideration.
Predator control	Control of mammalian predators (rats, mink, foxes, feral cat) at seabird colonies (eradication, fencing etc).	Discounted – Due to nature of kittiwake largely nesting on sheer cliffs, mammalian predation is not known to be a significant problem at most breeding locations.
Supplementary feeding	Chicks are hand fed to provide additional nutrition and increase productivity.	Discounted – Low degree of confidence that the measure would be feasible at the scale required for Round 4.
Reduce human disturbance	In many cases reduced human disturbance is known to benefit species of seabird.	Discounted – Low degree of confidence that the measure would be feasible at the scale required for Round 4.
Removal of vegetation surrounding breeding colonies	Increase available nesting area.	Discounted – Low degree of confidence that the measure would be feasible at the scale required for Round 4.

Bycatch reduction	The implementation of measures or practices to reduce the risk of by-catch to seabirds in commercial fisheries.	Discounted – Estimates of seabird by-catch suggest kittiwake are of low vulnerability to bycatch in UK waters (Northridge *et al.*, 2020).
Offal provision	Provision of offal from commercial fisheries to natural/ artificial kittiwake colonies to increase productivity. Offal would be provided at sea to avoid hand feeding.	Discounted – There is significant uncertainty around this as a measure due to the lack of evidence relevant to species or in UK waters.
Improving existing onshore artificial nesting sites	Enhance breeding success of kittiwake at artificial locations by encouraging them to breed on optimal nesting ledges at the same location on nearby buildings.	Discounted – Low degree of confidence that the measure would be feasible at the scale required for Round 4.
Avian predator management	Management of avian predators such as crows, large gulls and skuas which are known to predate kittiwake, their chicks and eggs.	Discounted – Low degree of confidence that the measure would be feasible at the scale required for Round 4.
Addition of nesting capacity at natural colony	Providing additional capacity at natural nesting locations where the colony size has increased beyond nesting availability.	Discounted – Lack of evidence of location where measure is relevant. Low degree of confidence that the measure would be feasible at the scale required for Round 4.
Colony protection from storm events	Provision of additional protection from the elements at existing kittiwake breeding colonies.	Discounted – Storm events are likely to be unpredictable and difficult to mitigate. Low degree of confidence that the measure would be feasible at the scale required for Round 4.

3.1.2 The Steering Group agreed that the following measures, presented in order of anticipated ecological effectiveness, had merit (as highlighted in Table 3.2 above) and would be investigated as strategic measures for the Round 4 Plan:

- Management of fisheries to increase prey availability;
- Onshore and offshore artificial nesting structures; and
- Habitat creation and other enhancement measures to increase prey availability.

3.1.1 Following discussion surrounding the suitability of onshore or offshore artificial nesting structures, the Steering Group decided to pursue offshore artificial nesting structures as a preference as a result of the ecological evidence presented in the following sections, and lack of certainty in the effectiveness of developing further onshore artificial nesting structures.

4 Agreement Log

Table 4.1 Round 4 Compensation Dogger Bank – Steering Group Agreement Log. Table also available as Appendix C.

ID	Topic area	Agreement	Comments	Joint Nature Conservation Committee (JNCC)	Natural England	(Department for Environment Food and Rural Affairs) DEFRA	Department for Energy Security and Net Zero (DESNZ)	RWE	Outer Dowsing Offshore Wind	The Crown Estate	Decisions/ response by The Crown Estate
1	Compensation options	The group agreed the two options to pursue in parallel as option A & B are: artificial nest structures and management of fisheries to improve prey availability	Discussed & agreed during SGKM3 on 28/03/2023	Agreed (31/10/23)	Agreed (22/5)	Defra noted practical concerns that would need to be taken into account around the delivery of any fisheries management measures. (LG 30/01/2024)	agreed (24/05/23)	Agreed, PDB (19/5/23)	RHF (22/05/23)	Agreed (BL) (19/06/2023)	No response required
2	Delivery	The group agreed strategic compensation was preferred noting a few caveats needed to be considered	Discussed & agreed during SGKM3 on 28/03/2023	Agree that strategic implementation would be preferable. Agree with NE that the funding and delivery mechanisms are currently uncertain. (31/10/23)	Clear advantages but also areas of uncertainty regarding implementation mechanism that need addressing (22/5)	Agreed (PL) (24/5)	Agreed (01/11/23)	Agreed, PDB (19/5/23)	Agree in principle but suggest wording required to set out caveats. (19/5/23)	Agreed (BL) (19/06/2023)	No response required
3	Design	The group agreed with the ANS design requirements required for Kittiwake (as per presented in the slides of M5 and are taken from Hornsea Three pattern book produced by LDA designs). (nice to have design elements e.g. additional monitoring design to be discussed separately)	Discussed & agreed during SGKM5 on 24/05/2023	Agree with general design requirements. However, while ANS have been accepted as compensation for impact on Kittiwake at project level, these are newly installed and assumptions around colonisation rates, productivity, dispersal and contribution to SPA and wider populations etc are untested. Do not agree that designing in the ability to monitor (including access for tagging etc) from the outset, is 'nice to have'. (31/10/23)	ANS design requirements are generally acceptable as agreed on 24/5, however we do not consider ensuring robust monitoring is 'nice to have' as understanding the performance of the ANS is needed to identify if adaptive management is needed (19/6)	Agreed, but also agree with SNCB that monitoring is needed. (LG 23/01/2024)	Agreed, but also agree with SNCB comments on nice to have and monitoring. (01/11/23)	We are content with the design criteria laid out in the draft plan (30/10/23)	Agreed. JL (12/6/23)	Agreed (BL) (19/06/2023)	The Crown Estate note that Government and SNCB's raise that monitoring should not be considered 'nice to have', but consider this agreement is with regards to design elements discussed within the Steering Group. It is agreed that monitoring is a vital constituent of a compensatory measure to allow for success to be identified and adaptive management to be implemented where required, but that the 'nice to have' design elements may allow for additional monitoring, or different monitoring techniques, above what is considered suitable and robust.

4	Compensation options	The group discussed the option of management of fisheries to increase prey availability. While there is uncertainty on delivery for compensation, the group agreed it should be included as a measure on the basis there is still prospect it could be a delivered as compensation. The group had previously agreed, and continued to agree that this is the 'best option' in terms of benefits to kittiwake, despite the inherent difficulties in monitoring and quantifying the benefit. It was agreed there was limited benefit of trying to advance the evidence base supporting the measure within the timelines available for the R4 Plan compensation proposals and focus should be spent on trying to develop a case which can be included within the kittiwake compensation plan (the overarching document intended to be submitted at the individual project DCOs).	Discussed & agreed during SGKM6 on 21st June 2023	Agreed (31/10/23)	Agreed (31/10)	We disagree that fisheries management should be used as a compensation measures as there is uncertainty in the predicted scale and timescale of recovery of seabirds and it is uncertain it would be enough to compensate for offshore wind impacts on seabird populations. A decision on using fisheries management as compensation is dependent on approval by Defra SoS. The text under Agreement column C does not reflect the latest changes going from 'best' measure to 'most ecologically beneficial' (LG 25/01/24)	Agreed. Noting the recent consultation in England and Scotland, there may also be merit in in looking at monitoring of any potential closures as part of a package of measures (hopefully to inform on future headroom) (01/11/23)	We are content with the text that appears within the draft plan as this keeps the option in play should decision-makers change stance in future (30/10/23)	JL 21/7/23. Agree in principle- noting that level of detail/time spent on this should not impact on delivery of plan to programme given the uncertainties around the measure. Focus should not be on non-essential elements if time is limited.	Agreed (BL) (20/07/2023)	The Crown Estate note Defra's view on fisheries management measures being included in the plan. Fisheries management was agreed to be the most ecologically beneficial compensatory measure identified by the Steering Group by the majority of members, in line with the decision making mechanism in the agreed Terms of Reference. The plan acknowledges that any measures implemented for Round 4 compensation must be 'additional', and also acknowledges uncertainty in delivery given the recent Defra consultation on sandeel management for other purposes, and goes on to identify offshore artificial nesting structures and a viable and deliverable alternative.
5	Compensation options	The group agreed that prey supporting habitat measures to increase prey availability for kittiwake were good to have as part of a package and that discussions would now look to focus on how benefits could be incorporated.	Discussed & agreed during SGKM6 on 21st June 2023	Agreed (31/10/23)	Agreed though not a priority (31/10)	As noted in the row above, we do not agree that fisheries management should be used as a compensatory measure (LG 30/01/2024)	Agreed (01/11/23)	Agreed in principle. It should be noted that areas proposed for extension of the DB SAC for compensation purposes would encompass known sandeel fisheries (see email from PP to Sara 24/08/23 for links) (30/10/23)	JL 21/7/23. As above. Agreed in principle. Focus should be on delivery of a functional plan to programme which allows DCO submission. Focus should not be on non-essential elements if time is limited.	Agreed (BL) (20/07/2023)	No response required
6	Monitoring	The SG agreed that the key factors informing ANS design are related to access, power (for monitoring, for example) and human safety	Discussed & agreed during SGKM6 on 21st June 2023	Agreed (31/10/23)	Agreed (31/10)	Agreed (LG) 22/11	Agreed (01/11/23)	Agreed (30/10/23)	Agreed JL 21/7/23	Agreed (BL) (20/07/2023)	No response required

7	Quantum	The method of quantum to be used will be the "new colony approach 2". It is noted there is still a question on which WCS parameters to use and any requirement for apportioning back to FFC SPA, but these will be covered in separate line items post further discussions	Discussed & agreed during SGKM7 on 2nd August 2023	Agreed re calculation method. The compensation target (i.e. the parameters used to calculate this using the agreed method) is not yet agreed and requires further discussion. (31/10/23)	Agreed re calculation method. Emphasise need for further discussions around how to generate compensation targets off the back of that calculation method, including how impacts of the 3 projects will be agreed and fed in (31/10)	Agreed as per SCNB comments (08/01 - LG)	Agreed - as per SNCB comments (01/11/23)	We maintain the position that the Hornsea 4 approach is our preferred option and that both the Hornsea 3 and Hornsea 4 method and results (i.e. no. of pairs delivered) should be presented in the plan. This will allow the SoS to make an informed decision having weighed the arguments from the examination. Providing the number of structures and a range of pairs delivered provides the necessary detail to all parties about what will ultimately be delivered. We are therefore content with the presentation of the data provided by RWE and ODOW in Table 7, noting that the data provided by developers represents a worst case scenario at the point the plan has been finalised and is likely to be reduced further going forward (24/01/2024)	We maintain the position that the Hornsea 4 approach is our preferred option and that both the Hornsea 3 and Hornsea 4 method and results (i.e. no. of pairs delivered) should be presented in the plan. This will allow the SoS to make an informed decision having weighed the arguments from the examination. Providing the number of structures and a range of pairs delivered provides the necessary detail to all parties about what will ultimately be delivered. We are therefore content with the presentation of the data provided by RWE and ODOW in Table 7, noting that the data provided by developers represents a worst case scenario at the point the plan has been finalised and is likely to be reduced further going forward (24/01/24)	Agreed (BL) 12/01/2024	The Crown Estate note the developers views that the Hornsea 4 method is their preferred approach, however, the wider view of the Steering Group is that the Hornsea 3 method is preferred. The plan documents presents the results f both methods, but clearly indicates that the Hornsea 3 method is recommended. This is in line with the decision making mechanism in the agreed Terms of Reference.
8	ANS	Offshore structures are preferred	Feedback from SG review of report	JNCC advises against the inclusion of onshore ANS in the Plan, and could not agree to this (31/10/23)	This matter is not just a question of 'preference' - NE advises against the inclusion of onshore ANS in the Plan. We support the Plan recommendation that onshore ANS are not progressed. (31/10)	Noting SCNB comments, Defra agrees to not include onshore ANS in the Plan, and identify ANS sites and take stocks on existing structures (08/01)	Noting the SNCB comments, DESNZ thinks it would also be useful to take stock of existing structures (onshore and offshore) in the overall assessment of where best position (and number) for ANS might be located in future (31/11/23).	Agreed in principle, noting that this is not a commitment and is based on a scenario where all projects proceed. If this was not the case then the requirement for two structures should be reviewed. We also maintain the position that onshore structures are a viable option and offer many practical benefits over offshore structures. We accept that this is not the position of the SG (24/01/2024)	Agreed, noting that onshore structures should not be discounted if a viable option is available within the necessary timeframes (24/04/20240	Noting SNCB views on reasons for offshore structures being preferred over onshore, this agreed (BL) 12/01/2024	The Crown Estate note the views of developers on onshore Artificial Nesting Structures. Offshore Artificial Nesting Structures are preferred in the plan due to the wider views within the Steering Group, in line with the agreed Terms of Reference.

9	On-shore ANS	For offshore SANS there are a number of delivery options being considered by the Steering Group. In order of preference these are: • The construction of two offshore SANS; • The construction of an additional two tiers (which equates to 2,000 nesting spaces) of nesting structures to Ørsted Hornsea Four offshore kittiwake structure and consideration of one additional standalone offshore SANS; • The construction of an additional two tiers (which equates to 2,000 nesting spaces) of nesting structures to Ørsted Hornsea Four offshore kittiwake structure and consideration of one additional standalone offshore SANS as part of adaptive management; and • The construction of an additional two tiers (which equates to 2,000 nesting spaces) of nesting structures to Ørsted Hornsea Four offshore kittiwake structure and one onshore SANS.	Feedback from SG review of report	As per line 8, JNCC only supports the provision of two offshore SANS. These could be either two new structures, or one new structure with the remainder of the compensation requirement being provided by the addition of tiers onto another, existing structure (e.g. the Hornsea 4 ANS). Our advice on this matter has been and remains that the sequencing of allocation of breeding kittiwake (if how breeding birds a re apportioned between H4 and R4), would need to be established, particularly during the colonisation stage. (24/01/24)	Of these options NE only supports the provision of two offshore SANS, one of which could be the additional two tiers on the Hornsea 4 structure.	Agree as per NE advice (08/01 - LG)	Agree with first two options as per NE. 19/12/23	The SG appeared to agree that 2 x offshore ANS, one of which could be an extension to a proposed Orsted Hornsea 4 offshore ANS was an acceptable approach. RWE maintains that onshore ANS are still a viable option (24/01/2024).	The SG appeared to agree that 2 x offshore ANS, one of which could be an extension to a proposed Orsted Hornsea 4 offshore ANS was an acceptable approach. ODOW note that onshore structures should not be discounted if a viable option is available within the necessary timeframes (24/01/2024)	Given discussions in the Steering Group to date, it appears the group are in favour of two structures which may include the Orsted tower, as per NE advice. (BL) 12/01/2024	The Crown Estate note the views of developers on onshore Artificial Nesting Structures. Offshore Artificial Nesting Structures are preferred in the plan due to the wider views within the Steering Group, in line with the agreed Terms of Reference.
10	OANS	It was agreed that 2 structures is preferrable to minimise risk	Agreed in the SGM9 call	Agreed. (24/01/24)	Agreed.	Agreed (08/01 LG)	Agreed 19/12/23	Agreed but we maintain our position that onshore towers are a viable option and should be considered by the SG moving forward (24/01/2024)	Agreed in principle, noting that this is not a commitment and is based on a scenario where all projects proceed. If this was not the case then the requirement for two structures should be reviewed. ODOW note that onshore structures should not be discounted if a viable option is available within the necessary timeframes (24/01/2024)	Agreed (BL) 12/01/2024	The Crown Estate note the views of developers on onshore Artificial Nesting Structures. Offshore Artificial Nesting Structures are preferred in the plan due to the wider views within the Steering Group, in line with the agreed Terms of Reference.

11	ANS seasons	The group agreed that there could be a reduction from the 'standard' 4 breeding seasons (with regard to delivery before impact). However, it would need to be evidenced that the potential mortality debt could still be paid off during the lifetime of the compensation and agreed with the SG first.		JNCC don't agree that the wording accurately reflects our advice or that there was agreement in the SG. Our advice was that a second structure could follow on a year later, but that our expectation was that one would be in place for 4 breeding seasons, and that delaying the second potentially increases the mortality debt build up and hence the potential total scale of compensation requirement. (25/01/24)	NE do not believe that this agreement was made in the SG and we consider that 10.1.4 of the updated plan does not reflect SNCB advice. NE's advice was that provided one of the two structures was installed 4 breeding seasons in advance, we would be open to the idea of a 2nd structure being installed only 3 breeding seasons in advance. In other words, there is the potential for flexibility around the installation of a 2nd offshore ANS but not both (25/01/24)	Content with this approach, subject to agreement with SNCBs and evidence supports reduction (LG 25/01/2024)	Content with this approach provided evidence supports reduction. (25/01/2024)	RWE support this approach as it gives greater chance of meeting UK targets for deployment of offshore wind and reduces the 'at risk' costs to developers (24/01/2024)	ODOW support this approach as it gives greater chance of meeting UK targets for deployment of offshore wind and reduces the 'at risk' costs to developers (24/01/2024)	The Crown Estate interpret the discussions within the Steering Group sessions that a reduction in breeding seasons would only apply to one of any two structures, and not both. This was the advice of the SNCB's into the Steering Group (BL) 24/01/2023	The Crown Estate consider the views of Natural England and JNCC to represent the discussions in the Steering Group, and the agreement of members in those discussion. This was that a reduction in breeding seasons from construction of the ANS to operation of the OWF would only apply to one of any two structures constructed.
12	Examination	Examiners Questions related to this KSCP during the DCO process following the submission of the KSCP should be directed to the relevant project applicant who will then convene the Steering Group to provide a response, ensuring that the view of the Steering Group is presented in line with the principles of the Steering Groups agreed Terms of Reference. It is requested that due to the requirement of input of the Steering Group the Examiners put forward Written Questions where practicable.		JNCC has a delegation arrangement in place with NE to provide statutory advice during the examination period. However, we don't agree with the wording as this would compromise the ability of SNCBs to provide statutory nature conservation advice as per our remit. (25/01/24)	As we will be providing statutory nature conservation advice on the KSCP into the Examinations, NE does not consider it appropriate for us to also be involved in formulating responses to any input requests. The Plan would be clearer if 10.2.3 reflected this. We hope to continue to provide Steering Group advice on other matters during the DCO processes subject to availability. (25/01/24)	We are content that examiners questions are directed at the relevant project applicant and not the points others have made. The ability to provide statutory advice shouldn't be compromised. We would be open to a discussion on the role of the steering group if this would be useful. (LG 25/01/24)	Appropriate that the initial contact on individual DCO applications is via applicant project with TCE and Steering Group being alerted/convened by them. (25/01/2024)	RWE maintain the position that TCE should be the initial point of contact to 1) highlight that this is not a project level plan and 2) ensure consistency of approach (24/01/2024)	ODOW maintain the position that TCE should be the initial point of contact to 1) highlight that this is not a project level plan and 2) ensure consistency of approach (24/01/2024)	Agreed (BL) 24/01/2024	The Strategic Compensation Plan has been developed in line with the principles agreed by members in the Terms of Reference. As it will act as a DCO application document for the developers there is potential that the Examiners may want to ask for clarity or detail around it's content. As such it is appropriate for the Steering Group to determine how to respond on these questions, rather than any one individual member. The agreed Terms of Reference provide that the Steering Groups will continue to exist until all obligations have been discharged, including post consent requirements, as such it is agreed that the Steering Group still be formed during Examination. It is acknowledged that some members of the Steering Group may wish to abstain from inputting during that period.

5 Proposed Compensation Approach

5.1.1 Prey enhancement through the management of key kittiwake prey (focusing largely on sandeel stock recovery) and associated ecosystem-based management was considered by the Steering Group to be the most ecologically effective means of increasing breeding success and therefore populations of kittiwake. The measure is evidenced in significant detail by information presented in recent and current OWF applications highlighted within Table 5.1. Management of fisheries to increase prey availability is therefore recommended by this compensation plan as the most ecologically beneficial measure to offset the impacts associated with the Round 4 Plan.

5.1.2 DEFRA ran a public consultation from 7 March 2023 to 30 May 2023 to gather views on the management measures of industrial sandeel fishing in English waters of the North Sea. This consultation considered the closure of the sandeel fishery for purposes other than HRA compensation. Subsequently DEFRA have provided a recommendation to ministers.

5.1.3 There are several potential delivery mechanisms related to this measure which were set out within the DEFRA consultation:

- Full closure of English waters within the North Sea. This option would see full closure of industrial sandeel fishing within the English waters of SA1r, SA3r and SA4;
- Closure of English waters within SA4 and SA3r. This option would be a partial closure in English waters, with industrial fishing prohibited in English areas of SA4 and SA3r; and
- Closure of English waters within SA1r. This option would be a partial closure in English waters, with industrial fishing prohibited in English area of SA1r.

5.1.4 DEFRA announced new plans on 31 January 2024 for a permanent closure of sandeel fisheries in English waters of the North Sea. As such, there is potential that the management of fisheries to increase prey availability may not be an available compensation option for Round 4. Information available at the time of drafting this KSCP did not convey whether the closure would be permitted as compensation. Therefore, this measure remains within the KSCP until information from DEFRA Secretary of State confirms its availability as a compensation measure for Round 4.

5.1.5 Due to the uncertainty around the availability of sandeel fisheries management as a compensation option, and the potential for alterations to the announced closure of sandeel fisheries, an alternative measure has been proposed (in line with the compensation hierarchy Figure 5.1) which can be led by the developer rather than rely on Government intervention to lead management actions associated with the management of fisheries to increase prey availability. The Steering Group agreed that strategic compensation planning resource for Round 4 should therefore be invested in offshore strategic artificial nesting structures ("SANS"). As such, 20his option is considered in the most detail within this KSCP.

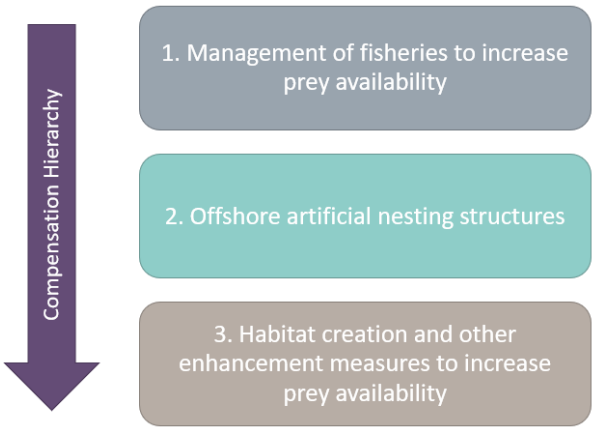

Figure 5.1 Compensation hierarchy of recommended measures

5.1.6 Round 4 SANS will focus on increasing productivity of kittiwake within the species biogeographic range via the provision of offshore SANS. This option will be pursued unless clear indication from Government is received of the acceptance of fisheries management as an appropriate compensatory measure for offshore wind projects, with a clear timescale for the implementation of this measure. As described in Section 5.3 there is significant evidence in support of offshore SANS which provides a high level of confidence in delivery.

5.1.7 If the delivery of fisheries management was permitted as a compensatory measure, the Round 4 compensation strategy advocates working strategically with Government to build on the approach presented in relevant documents listed with regard to offshore wind applications in Table 5.1. However, the Steering Group agreed that due to the current uncertainty associated with the delivery of the measure, plus the detailed information presented by projects listed (and relevant documents cited) in Table 5.1 on a potential approach, there was limited ability for the Steering Group (and therefore this KSCP) to add significant substance in the form of planning. Notwithstanding the above, a summary of evidence supporting the measure is presented in Section 5.2.

5.1.8 Habitat creation and other enhancement measures to increase prey availability were determined by the Steering Group to be a resilience measure (i.e., it can support the other measures mentioned above but does not have evidence to support it as a primary measure if implemented alone). Due to the high level of uncertainty surrounding the most appropriate enhancement method to increase key prey availability to kittiwake (plus current difficulties in showing benefit for kittiwake) this measure would be progressed (if required) following further discussions with the Steering Group post-consent or via adaptive management following implementation of either of the other measures. Enhancement measures to increase prey availability are not discussed further within this KSCP.

5.1.9 It is important to note that the Round 4 plan is also required to compensate for impacts associated with the sandbank feature at Dogger Bank SAC. While measures associated with that feature are being dealt with via a parallel compensation process for that Protected Site, the focal measures could be linked to key kittiwake prey habitat. Therefore, linkages between the final Dogger Bank Strategic Compensation Plan and this KSCP will be explored by the kittiwake Steering Group following approval

of both Strategic Compensation Plans to determine potential avenues for establishing synergies such as joint monitoring or delivery in line with kittiwake measures (noting synergies will be explored in further detail following consent).

5.1.10 The following sections summarise the evidence supporting both primary compensatory measures and signpost to more detailed accounts of supporting information.

5.2 Management of fisheries to increase prey availability supporting evidence

5.2.1 North Sea breeding kittiwakes feed mainly on sandeels during the breeding season (Furness and Tasker 2000, Coulson 2011), with kittiwake breeding success (and the subsequent influence of increase or decreases in colony size) being strongly associated with sandeel abundance (Monnat *et al.*, 1990, Frederiksen *et al.*, 2004, Curry *et al.*, 2011, Carroll *et al.*, 2017, Christensen-Dalsgaard *et al.*, 2018).

5.2.2 Kittiwake breeding success at the Isle of May was adversely impacted when the sandeel stock in that area was significantly depleted by fishing. Breeding success was on average 0.5 chicks per pair lower during years when sandeel fishing occurred when compared to years with no sandeel fishing (Frederiksen *et al.*, 2004). Similarly, adult survival was also lower during years with sandeel fishing (Frederiksen *et al.*, 2004). Other sandeel stocks distinct from those relevant to the Isle of May (such as around Shetland or in the southern North Sea (ICES, 2017)) are also strongly influenced by sandeel abundance (i.e., Shetland sandeel stock collapse and subsequent impacts to kittiwake population (Furness and Tasker 2000)). In relation to the southern North Sea, the productivity of kittiwakes at FFC SPA is significantly correlated with sandeel stock biomass, particularly relating to the sandeel stock in ICES North Sea sandeel management Area 1r ('Dogger Bank' and neighbouring areas) (Carroll *et al.*, 2017). Fishing on sandeels is one of the main factors that reduces the abundance of sandeels in the North Sea (Lindegren *et al.*, 2018).

5.2.3 Ecosystem modelling suggests the cessation of the sandeel fishery in the North Sea could result in a 40% increase in the biomass of the sandeel stock and consequently result in a 42% increase in the number of seabirds (with kittiwake likely to be a key beneficiary due to their dependence of sandeel) within the first 10-15 years after closure of the sandeel fishery (Bayes and Kharadi 2022). A large body of detailed information relating to the evidence supporting this compensatory measure is presented within the documents identified in Table 5.1.

Table 5.1 Summary of Offshore Wind Projects which propose to implement management of fisheries to increase prey availability

Project Name	Relevant compensatory measure	Current Status	Supporting Evidence
Sheringham and Dudgeon Extension	Prey Enhancement through Sandeel Stock Recovery and Ecosystem-Based Management	Recommendation	Section 3.3 of MacArthur Green (2022a)
Berwick Bank	Sandeel fishery closure	Application	MacArthur Green (2022b) and section 2.5, 3 of SSE (2023)

5.2.4 Management of sandeel fisheries to increase abundance of sandeel is likely to result in an increase in productivity, adult survival, and breeding numbers of kittiwake within the area of the sandeel stock (Furness, 2013). The DEFRA Consultation Outcome summary of responses to "future management of sandeel and Norway pout in UK waters" (DEFRA, 2022) remarked that new restrictions in the sandeel fishery "*could lead to positive ecological impacts by allowing these stocks to recover and support the health of the rest of the marine ecosystem*" with "*the bounce back of heathy fish, seabird and marine mammal populations*". Further support of the option as a potential strategic compensation measure is provided by the detailed MacArthur Green (2021c) strategic compensatory measures review.

5.2.5 There is significant potential for the measure to provide far greater compensation than even the most precautionary estimates of losses incurred due to the Round 4 plan and other UK offshore wind proposals in the pipeline. Prey enhancement is included as a key proposed measure within proposals for kittiwake compensation for the Round 4 plan, but as a measure that would also encompass compensation requirements for other projects. Consequently, an option for Round 4 strategic compensation to pay a financial contribution towards the establishment of prey enhancement via management of fisheries as a strategic compensation measure or as an adaptive management measure (should a mechanism become available within the necessary timescales relevant to the Round 4 plan) has been recommended for inclusion within the Draft DCOs for DBSW, DBSE and ODOW.

5.2.6 Information relating to potential mechanisms which would help to determine the scale of fisheries management required to compensate for the AEOSI associated with the Round 4 plan and relevant monitoring and adaptive management is also discussed within the advanced proposals highlighted in Table 5.1. How Round 4 strategic compensation proposals based on fisheries management would align would be determined once the measure has been judged as viable (i.e., after Government has demonstrated a willingness to deliver this as compensation) in agreement with the Steering Group. Such proposals are therefore not covered further within this KSCP. It should also be noted that timescales for fisheries management measures may not align with the Round 4 compensation process.

5.3 Artificial nesting evidence

5.3.1 Given the acknowledged risks to the delivery of fisheries management to increase prey availability as a compensatory measure for Round 4), offshore SANS has been covered in detail in the following sections to provide confidence that the impact associated with DBSW, DBSE and ODOW of the Round 4 plan can be compensated through alternative feasible and deliverable measures.

5.3.2 Evidence (see relevant report sections presented within Table 5.2) strongly suggests that the provision of additional offshore SANS for kittiwake would be an adequate compensatory measure as kittiwakes readily utilise man-made structures located onshore and offshore. There are successful examples of sites where kittiwakes have opportunistically made use of existing human-made structures to successfully breed (NIRAS, 2021b and NIRAS, 20212). To date, no sites have been designed and implemented specifically for this purpose in an offshore location but sites designed for this purpose onshore have been successful e.g. Saltmeadows Tower in Gateshead (Kittiwakes upon the Tyne, 2023) (with compensation relevant examples recently installed onshore and nearshore at Lowestoft (Ørsted 2023, Vattenfall 2023)).

5.3.3 Kittiwake were first recorded breeding offshore on platforms in the Norwegian Sea in the early 1990s (Christensen-Dalsgaard *et al.,* 2019), and first bred successfully on an offshore structure in the UK at

Morecambe Gas Platform (Irish Sea) in 1998 (Unwin, 1999). During the early 2000s birds also colonised platforms in the Dutch North Sea and more platforms in the Norwegian Sea.

5.3.4 A study by Christensen-Dalsgaard *et al.* (2019) assessed the differences in breeding productivity of kittiwake in Norway, between breeding colonies on natural cliffs, man-made onshore structures (e.g. buildings and bridges) and offshore rigs. This study determined that offshore rigs had the greatest rates of productivity (ranging on average between 0.61 to 1.07 large chicks per nest), followed by onshore man-made structures, and with natural cliffs having the lowest rates of productivity.

5.3.5 The study by Christensen-Dalsgaard *et al.* (2019) concluded that predation may be a major factor in breeding success, with offshore rigs being less exposed to predators such as mammals and corvids. However, the study determined that the proximity of the rigs to food resources may also have played a role in higher breeding productivity. Previous studies of kittiwake breeding in central Norway showed that in periods with low food availability, some of the chick-feeding adults extended their foraging range up to 400 km from the colony in order to forage at the shelf break (Christensen-Dalsgaard *et al.,* 2018), where prey is often concentrated. By breeding on the oil rigs birds might have been able to reduce the travel distance to such predictable foraging areas considerably and thereby increase their foraging efficiency compared to birds breeding onshore.

5.3.6 Therefore, there is confidence based on the best available evidence presented above and within Table 5.2 that the following are anticipated to result in increased productivity when compared to onshore colonies and there is overall confidence in the efficacy of offshore SANS as a whole as a proposed compensatory measure:

- The provision of offshore SANS providing potentially optimal nesting habitat in close proximity to foraging grounds (and therefore reduce foraging duration for kittiwake as central place foragers);
- 360 degree access to foraging habitat;
- Lower predation risk (due to distance offshore and design to prevent large gull roosting); and
- Protection from exposure (due to detailed structure design).

5.3.7 A purpose-built structure may result in a larger and more productive colony than modifying existing platforms to accommodate nesting kittiwakes. This is based on the assumption that the purpose-built structure would have less conflicting issues arising from the scale at which to maintain health and safety standards and the absence of routine working operations. It is known that young kittiwakes will disperse and potentially make use of other breeding locations (Coulson, 2011). A relatively small proportion (as few as 11%) tend to remain at their natal sites (and thus create the basis for the development of a sustainable additional colony) with the remainder finding other breeding sites. As a result of the low proportion of birds likely to return to their natal sites (such as FFC SPA but also other SPA and non-SPA breeding colonies), there is a large pool of potential recruits within the meta-population which can utilise the Round 4 offshore SANS to breed.

5.3.8 The number of breeding adults that have previously bred at a colony such as the FFC SPA that subsequently relocate to other colonies (potentially including the Round 4 offshore SANS), is very low (between 1.2% in colonies where populations are increasing, and productivity is high and 6.2% in colonies where populations are declining). Despite the exact value for FFC SPA being unknown it is likely to be somewhere between these values (1.2% and 6.5% (Horswill and Robinson 2015)) implying that even if birds were to relocate to another colony, such as the Round 4 offshore SANS, the proportion of the breeding population affected would be very low. On this basis, it is considered that

there is no indication that the construction and operation of Round 4 offshore SANS would adversely affect the breeding kittiwake feature of FFC SPA or any other SPA.

5.3.9 Additionally, a large breeding population of kittiwake currently exists on oil and gas rigs in the southern North Sea (as detailed in Hornsea Four documents outlined in Table 5.2), many of which are due for decommissioning within the next decade therefore potentially providing a pool of adult birds into the meta-population which may utilise the Round 4 SANS to breed.

5.3.10 The offspring produced by birds nesting at Round 4 offshore SANS will provide additional recruits to the meta-population, which in turn provides the breeding adult birds that colonise the cliffs of the FFC SPA as well as other colonies on the east coast of England, which also form part of the national site network, therefore maintaining the network's coherence. It is also anticipated that as a matter of Government policy (as referred to within paragraph 187 of the National Planning Policy Framework[3] , and DEFRA's Guidance (*Habitat regulation assessments: protecting a European site*[4])the compensation (i.e., the offshore SANS) would be given the same level of protection as an SPA.

5.3.11 Hornsea Four received its DCO from the Secretary of State on the 12th July 2023, permitting the project to develop the offshore wind farm. Within the Secretary of State's Appropriate Assessment it was determined there was an AEOSI on the National Site Network in relation the kittiwake feature of the FFC SPA, as a result of the Hornsea Four development in-combination with other plans and projects. The DCO required the project to base compensation for kittiwake on the details set out within the compensation plan which states the measure would *"increase the annual recruitment of kittiwake into the biogeographical kittiwake population"* (Ørsted 2022). This demonstrates that past DCO decisions have accepted offshore compensation delivery at a wider population scale than specifically focussing on FFC SPA.

5.3.12 A number of projects have proposed ANS as compensation to kittiwake as a result of windfarm collision induced mortality associated with FFC SPA. Each project presented a significant body of evidence in support of the compensatory measure. Table 5.2 provides a summary of those projects which proposed compensation for kittiwake in the form of ANS.

Table 5.2 Summary of Offshore Wind Projects which have/ or propose to implement artificial nesting structures

Project Name	**ANS Variant**	**Current Status**	**Supporting Evidence**
Hornsea Three	Onshore and nearshore (within 5km) ANS	Consent granted 2020	NIRAS (2020)
Norfolk Boreas	Onshore ANS	Consent granted 2021	Section 4.5 of MacArthur Green (2021a)
Norfolk Vanguard	Onshore ANS	Consent granted 2022	Section 4.5 of MacArthur Green (2021b)

[3] https://www.gov.uk/guidance/national-planning-policy-framework/15-conserving-and-enhancing-the-natural-environment
[4] https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site

East Anglia ONE North and TWO	Onshore ANS	Consent granted 2022	Section 5.4.3 of MacArthur Green and Royal HaskoningDHV (2022)
Hornsea Four	Offshore ANS (preferred option)	Consent granted 2023	NIRAS (2021b) and NIRAS (2021c)
Sheringham and Dudgeon Extension	Offshore ANS (although preferred option is modification to onshore ANS due to very low predicted impact)	Recommendation	Section 3.7 of MacArthur Green (2022a)

5.3.13 As indicated above, ecosystem modelling suggests the cessation of the sandeel fishery in the North Sea could result in a 40% increase in the biomass of the sandeel stock and consequently result in a 42% increase in the number of seabirds (with kittiwake likely to be a key beneficiary to their dependence of sandeel) within the first 10-15 years after closure of the sandeel fishery (Bayes and Kharadi 2022). Even if the management of fisheries to increase prey availability was not to be permitted as compensation, there is a high likelihood that the management of fisheries (sandeel) would be undertaken in English waters regardless as part of the UK Government's role in ensuring healthy ecosystems (DEFRA, 2022). Round 4 offshore SANS located within foraging range of the proposed fisheries management areas could take advantage of the anticipated increase in prey which, if utilised by the breeding kittiwake, would result in enhanced breeding success.

5.3.14 As conveyed by Table 5.2, a number of OWF projects have already proposed and been consented on the basis of delivering ANS. This shows the measure is both feasible and can be implemented (as documented by the fully implemented onshore and nearshore ANS delivered by Norfolk Boreas and Vanguard and Hornsea Three). Further support of the option as a potential strategic compensation measure is provided by the detailed MacArthur Green (2021c) strategic compensatory measures review.

5.3.15 The following sections of this report focus on presenting the detail of the proposed Round 4 offshore SANS and how the measure can be secured.

6 Ecological Function of the Compensation

6.1.1 Compensation is aimed at offsetting the impacts associated with the collision mortality of kittiwake associated with FFC SPA. The FFC SPA, designated in 2018, is an extension of the former Flamborough Head and Bempton Cliffs SPA, which was designated in 1993. It is located on the East Yorkshire coast between Bridlington and Scarborough and consists of two sections: the northern section from Cunstone Nab to Filey Brigg and the southern section from Speeton to South Landing, around Flamborough Head. The seaward boundary extends 2km offshore for both sections. The coastal areas of the SPA support internationally important breeding populations of seabirds, while the marine extension includes areas near the colony used by seabirds for maintenance behaviours such as loafing and preening.

6.2 Conservation objectives

6.2.1 The site's conservation objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the aims of the Birds Directive (2009/147/EC), by maintaining or restoring:

- The extent and distribution of the habitats of the qualifying features;
- The structure and function of the habitats of the qualifying features;
- The supporting processes on which the habitats of the qualifying features rely;
- The populations of each of the qualifying features; and
- The distribution of qualifying features within the site.

6.2.2 Natural England (2020) has stated the target is to restore the size of the kittiwake breeding population to a level which is above 83,700 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.

6.2.3 At the time of the former Flamborough Head and Bempton Cliffs SPA classification in 1993, the kittiwake breeding population was cited as 83,370 breeding pairs based on a 1987 census. The breeding adult kittiwake population of the FFC SPA at classification in 2018 was cited as 44,420 pairs or 89,040 breeding adults. This was based on counts carried out between 2008 and 2011 (Natural England, 2018). This suggests a decline of about 50% in the size of the breeding population between 1987 and 2008 to 2011.

6.2.4 Supplementary advice on the conservation objectives were added for qualifying features of the FFC SPA in 2020 (Natural England, 2020). For kittiwake, these are:

- Restore the size of the breeding population to a level which is above 83,700 breeding pairs, whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent;
- Restore safe passage of birds moving between nesting and feeding areas;
- Restrict the frequency, duration and / or intensity of disturbance affecting roosting, nesting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed;
- Restrict predation and disturbance caused by native and non-native predators;
- Maintain or recover productivity so that breeding success is maximised within the constraints of the site;
- Maintain concentrations and deposition of air pollutants at below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System;
- Restore the structure, function and supporting processes associated with the feature and its supporting habitat through management or other measures (whether within and/or outside the site boundary as appropriate) and ensure these measures are not being undermined or compromised;
- Maintain the extent, distribution and availability of suitable breeding habitat which supports the feature for all necessary stages of its breeding cycle (courtship, nesting, feeding) at: current extent;
- Restore the distribution, abundance and availability of key food and prey items (e.g. sandeel, sprat, cod, squid, shrimps) at preferred sizes;
- Restrict aqueous contaminants to levels equating to High Status according to Annex VIII and Good Status according to Annex X of the Water Framework Directive (2000/60/EC), avoiding deterioration from existing levels;

- Maintain the dissolved oxygen (DO) concentration at levels equating to High Ecological Status (specifically ≥5.7mg per litre (at 35 salinity) for 95% of the year), avoiding deterioration from existing levels;
- Maintain water quality at mean winter dissolved inorganic nitrogen levels where biological indicators of eutrophication (opportunistic macroalgal and phytoplankton blooms) do not affect the integrity of the site and features, avoiding deterioration from existing levels. This target was set using the Environmental Agency 2019 water body classifications data; and
- Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.

7 Predicted Effects of the Plan

7.1.1 Modelling undertaken within The Crown Estate's Appropriate Assessment (The Crown Estate, 2022) (informed by NIRAS, 2021a) predicted the impact on the kittiwake feature of the FFC SPA to be 108 collisions per annum. This was when considered in-combination with other plans and projects, as a result of the potential collision effect for kittiwake from the operational and maintenance phase of the DBSW, DBSE and ODOW projects. This KSCP aims to provide flexibility to enable compensation planning of project level impacts once calculated. The following aspects of this report therefore enable the measure to be scaled according to the project level impacts determined via the individual project Appropriate Assessments.

8 Scale

8.1 Background to determining compensation population

8.1.1 Scale in relation to offshore SANS relates to the required breeding population of kittiwake needed to offset the impact of DBSW, DBSE and ODOW projects. Scale is therefore a vital aspect in the planning of compensation as it informs the design, cost, monitoring and adaptive management and can determine site selection of compensatory measures.

8.1.2 Compensation in respect of the mortality risk to seabirds as a result of offshore wind farm impacts is still in its relative infancy when compared to port developments or other similar projects requiring derogation. The current lack of developed and functioning compensatory measures for seabirds, in particular kittiwake, creates a level of uncertainty surrounding the suitable scale of compensation. As more offshore wind projects and associated compensation proposals are consented, the amount of evidence to support decision making will increase via detailed monitoring procedures stipulated for each project within the DCOs.

8.1.3 Despite the lack of tangible compensation projects to date (noting the implementation of a number of ANS during 2022), a wealth of relevant evidence is available from onshore, nearshore and offshore nesting structures to inform planning. Much of this information has been captured within recent offshore windfarm planning applications (with evidence highlighted within Table 5.2).

8.1.4 Determining the scale of compensation requires a stepwise approach outlined in Figure 8.1. Step 1 (calculate the project level impact) was determined at a plan level for the three Round 4 projects in Section 7 and will be revisited to align with project level impacts when available. Step 2 (determine the compensation population) and Step 3 (application of compensation ratio) are discussed in the following section.

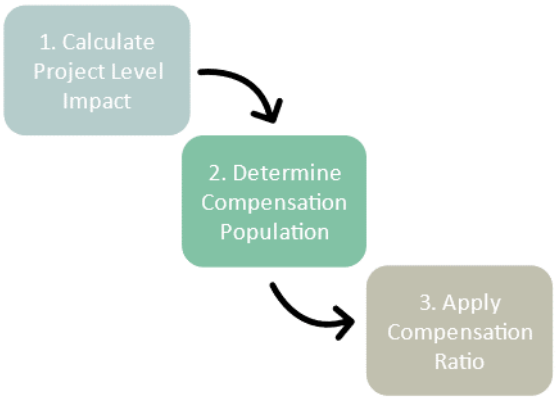

Figure 8.1 Simplified schematic showing the stages of determining the scale of compensation

8.2 Method to determine the compensation population

8.2.1 A detailed review of previous approaches used by offshore wind farm developments to determine the level of compensation required (Step 2 above) was undertaken by NIRAS to inform Steering Group discussion and consequently provide recommendations for a suitable approach for strategic compensation. The review recommended the use of the 'New Colony Approach' (as used by Hornsea Three (Ørsted, 2020[5])) to calculate the number of nests required for the Round 4 offshore SANS. Unlike other preceding offshore wind farm projects, Hornsea Three and Four calculated the predicted age at which the first-time breeders are recruited to colonies using the age of recruitment proportions of breeding kittiwakes observed at the North Shields onshore ANS colony based on observations cited in Coulson (2011). This is due to kittiwake first age of breeding being highly variable, but averages at four years old.

8.2.2 The age of recruitment proportions were initially used to calculate the predicted age at which the first-time breeders are recruited to colonies. This was followed by estimating the total number of fledglings required by calculating the number of birds in each age category that would be needed both to contribute the number of new recruits for that calculated and to survive into the subsequent age category. Survival rates for both juvenile and 1+ year old kittiwakes were taken from Horswill and Robinson (2015).

8.2.3 The sum of the total number of fledglings required to produce first-time breeders for each age category was multiplied by the productivity rate. Finally, an additional component took account of

[5] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-003241-HOW03_30Sep_Appendix_2_Annex_2%20Ecological%20Evidence%20(06543000_A)%20combined%20(06543760_A).pdf

between 11% and 23% birds (Horswill and Robinson 2015, Coulson 2011) that are philopatric i.e. that remain at their natal colony to breed.

8.2.4 The final stage of Hornsea Three's calculations goes towards addressing the need to maintain the new breeding colony at the offshore SANS without contributing in effect to reducing a further loss of birds from the existing meta-population to make up for annual mortality of breeding adults at the ANS. Additional information on calculations for how the method to determine compensation quantum was derived is provided within Appendix E of NIRAS (2020).

8.2.5 During the initial phase of colonisation of the offshore SANS, the breeding birds will be those that would otherwise have bred in existing colonies in that year or a subsequent year i.e. birds being recruited into the breeding population a year or more earlier than in the absence of the offshore SANS. In consequence, one or more existing colonies may be reduced in size of the breeding population when compared to a scenario in which the offshore SANS was absent.

8.2.6 Initially the number of birds colonising the offshore SANS will be very small in relation to the size of the established colonies at FFC SPA. Colonising birds will be drawn from a larger meta-population of birds of breeding age. For example, Horswill and Robinson (2015) state that 89% of chicks produced within a colony relocate to breed thereafter in other colonies, which could include the Round 4 offshore SANS. Furthermore, the number of breeding adults that have previously bred at a colony such as the FFC SPA that subsequently relocate to other colonies (potentially including the Round 4 offshore SANS), is likely to be very low (see Section 5.3 for further detail).

8.2.7 Whilst birds may recruit at a younger age to the breeding population in the presence of an offshore SANS (due to potentially more nests sites with good productivity encouraging earlier breeding), this doesn't necessarily infer an increase in the lifetime of breeding or total overall productivity. No 'new' breeding birds will be introduced into the meta-population in the absence of an offshore SANS until productivity of one or more pairs is above the amount that it would have been in the absence of the offshore SANS. Moreover, the additional productivity needs to generate additional breeding pairs which are self-sustaining with respect to natural mortality, so as not to reduce the meta-population size to below the level that would be anticipated in the absence of an offshore SANS.

8.2.8 So as not to reduce the meta-population distributed across existing colonies below that which would be seen in the absence of collision mortality and the offshore SANS, the latter needs to provide for alternative nesting sites to a number of pairs that itself results in a higher level of productivity. This additional 'excess' provides for:

- Replacement of breeding birds at the SPA of interest, lost to collision mortality;
- Replacement of the breeding population that would have been at the existing colonies if having not colonised the offshore SANS; and,
- Replacement of annual (natural) mortality of the breeding adult at the offshore SANS i.e. a self-maintaining breeding population at the offshore SANS, if it is within the wider meta-population. In the absence of such replacement, the offshore SANS will continually be drawing upon that component of the meta-population that numerically 'pre-existed' for the existing colonies.

8.2.9 To determine the required number of nesting pairs of kittiwake needed to compensate the combined impact of DBSW, DBSE and ODOW, both the Hornsea Four and Hornsea Three approaches were explored (with both approaches presented within Table 8.1). The SNCBs and DESNZ favoured the

Hornsea Three approach while the DBSW, DBSE and ODOW developers expressed a clear preference for the Hornsea Four approach (APEM, 2021). Following the Steering Group terms of reference, the recommendation is to align with the Hornsea Three approach (but noting that discussion regarding ratios are deferred to post application when further information is available, see section 8.3).

8.2.10 Using the Hornsea Three method, the number of breeding pairs required to compensate the combined predicted annual collision mortality (108 adult kittiwake) for the Round 4 Plan level assessment was calculated as 598 nesting pairs of kittiwake. However, during the course of the Steering Group meetings, preliminary worst case project level collision assessment outputs (using 95% upper confidence intervals) were provided by DBSW, DBSE and ODOW to update calculations of the number of nesting pairs required to compensate the combined impact (Table 8.1). It should be noted that these outputs are yet to be agreed with Natural England.

Table 8.1 Combined impact of DBSW, DBSE and ODOW based on project level preliminary collision risk modelling values, and various approaches to determine the compensation population.

Project	Annual FFC SPA Apportioned Impact (individuals)	Hornsea Four Approach – numbers of pairs required to offset impact	Hornsea Three Approach – numbers of pairs required to offset impact
ODOW	56.56	151.05	312.95
DBSE	115.95	309.66	641.57
DBSW	165.72	442.58	916.95
Total	338.32	903.29	1871.97

8.2.11 While Table 8.1 provides an initial estimate of the compensation population based on preliminary collision risk modelling results, it does not yet take account of a compensation ratio, which is discussed in Section 8.3. Therefore for the purposes of informing compensation scale, the Steering Group agreed that an 'envelope approach' (akin to a 'Rochdale envelope') type approach should be defined for the purposes of this KSCP to provide an lower and upper limit which will be refined following the submission of this KSCP and defined within the KSIMP.

8.2.12 The lower limit of the offshore SANS was agreed at 2,500 nesting spaces while the upper limit was agreed to be 5,500 nesting spaces across two offshore SANS (delivery mechanism presented within Section 11). These estimates were based on the likely feasible scale of structure based on discussions with the Steering Group and were informed by conversations with other offshore compensation projects developing offshore nesting structures. It was agreed that nesting spaces would be used to define the lower and upper limits of the 'compensation envelope' approach as they have been identified as options for potential delivery offshore (as described in Section 11).

8.2.13 The scale of the impact requiring compensation will be refined by the Steering Group and defined within the KSIMP once project level impacts have been finalised.

8.3 Compensation ratio

8.3.1 A compensation ratio is typically applied to ensure that the compensatory measures fully off-set the predicted impact on a site/feature. Ratios close to 1:1 are appropriate in circumstances where the compensatory measure is very similar in character and scale to the feature being compensated (i.e. it is like for like). Where the measure is less like for like and/or there is uncertainty about its delivery then higher ratios may be applied. In determining an appropriate ratio it is also important to consider precedents set in other, similar cases, and it also needs to be proportionate to the effects predicted.

8.3.2 The ecological evidence supporting the application of ratios to compensation populations is scant. Hornsea Three provided supporting evidence for multiple structures in at least two distinct locations. However, the decision to commit to deliver four structures was based on a qualitative approach. With regard to the other projects which have also proposed ratios, supporting evidence has been limited, with application or ratios based largely on contrived estimates which factor in inherent precaution built into impact estimates, calculations to determine the compensation population and likelihood of success of the measure. A level of complexity is added when the status of the project is considered.

8.3.3 Based on the provision of an offshore SANS of the scale proposed, and in line with the potential locations discussed below, a ratio of above 1:1 is proposed for the purposes of informing planning at this stage. Following the refinement and agreement of final Round 4 offshore SANS locations, ratio and/ or other factors linked to the potential apportionment of kittiwake produced via the R4 offshore SANS will be agreed with the Steering Group and will fall within the 'compensation envelope' set out above.

9 Location

9.1.1 In relation to the potential location of the Round 4 offshore SANS, a detailed and multi-stakeholder site selection process has been undertaken by NIRAS to provide a shortlist of candidate areas of search ("AOS").

9.1.2 Considerable site selection work has been undertaken and presented for both an onshore and offshore context by recent offshore wind farm compensation cases. Those of particular relevance are listed in Table 5.2. The method of site selection presented here builds on this work, using similar approaches.

9.1.3 The aim of the site selection process was to produce a shortlist of AOS which are suitable (from an ecological perspective) and feasible (from a 'hard constraint' perspective as explained in Appendix D) candidates for an offshore SANS for Round 4 compensation. Presenting a shortlist of AOS permits flexibility within the compensation case if certain favoured locations fail to succeed in later stages of planning (due to unforeseen reasons). Furthermore, the timescales associated with developing the Round 4 compensation case mean that the lengthy process of micro siting and other associated factors could not be accommodated within the timeframes of delivery of the KSCP. Therefore, focus has been placed on gaining agreement within the Steering Group of a shortlist of potentially suitable AOS and identifying subsequent development criteria.

9.1.4 The criteria were developed to enable potential locations for an offshore SANS to be ranked and were categorised as either 'critical' or aimed at optimising the success of the measure. Criteria were refined from those used in previous offshore wind project ANSs, which were made publicly available as

compensatory measures (such as Hornsea Three and Four). As a result, these criteria have undergone a detailed consultation process and were reviewed by SNCBs and other stakeholders. This process ensures a strong foundation for determining suitable potential locations for kittiwake Round 4 offshore SANS.

9.1.5 The Steering Group reached a consensus that the criteria were appropriate and agreed to apply them to potential locations as part of the strategic measure planning. Appendix D outlines the site selection process undertaken by NIRAS on behalf of TCE to determine ecologically beneficial locations to construct an offshore SANS for breeding kittiwake in the North Sea.

9.1.6 A detailed site selection report is provided within Appendix D, along with the shortlist of AOS and associated scoring provided.

9.1.7 In addition to the site selection work described above, DBSW, DBSE and ODOW were asked to provide AOS to increase the potential list of AOS. ODOW (Outer Dowsing Offshore Wind Farm, 2023) provided a detailed ecological evidence and site selection report as part of their Preliminary Environmental Information Report process which presented two offshore AOS. An additional two offshore AOS were provided by ODOW at a later date. DBSW and DBSE jointly presented a single onshore AOS.

9.1.8 Hornsea Four (developed by Ørsted and currently progressing an offshore ANS for kittiwake in the southern North Sea) was also invited to join the Steering Group for meeting number eight. Hornsea Four presented the potential opportunity of collaborating in the construction of an ANS which would be additional to the Hornsea Four DCO requirement. A single AOS has been provided (with relevant site selection process detail provided in Ørsted (2021)) and joins all the aforementioned AOS from NIRAS, DBSW, DBSE and ODOW in Figure 9.1.

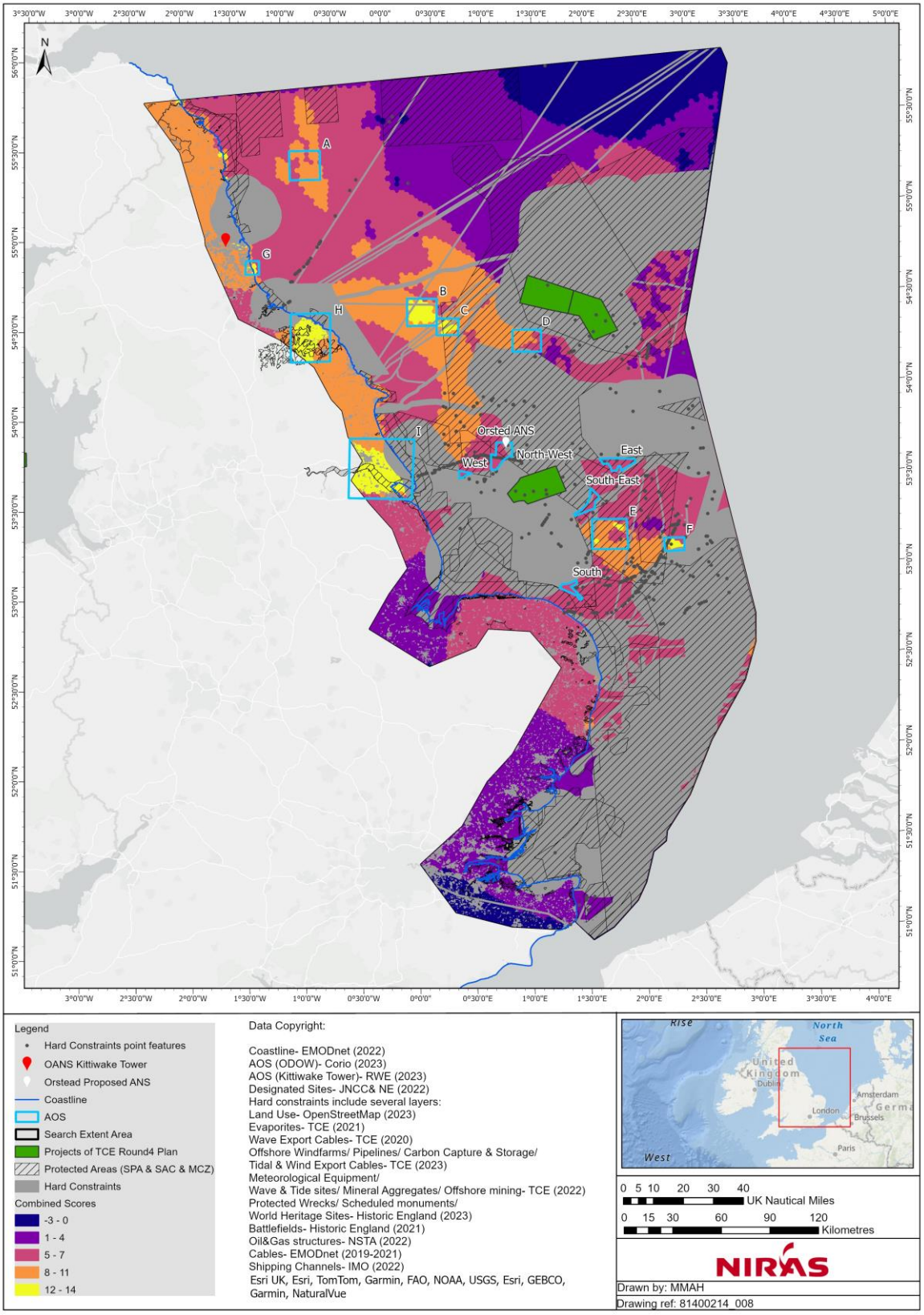

Figure 9.1 Summary of potential AOS for SANS, with details from: NIRAS, DBSW, DBSE, ODOW & Ørsted

10 Design

10.1.1 The design of the Round 4 offshore SANS builds on the evidence presented by NIRAS (2021b & 2021c) of kittiwake nesting on artificial structures across the species breeding range. ANS suitable for kittiwake ideally comprises of vertical walls with horizontal nesting ledges coupled with a vertical drop to water below ledges. Ledges should also be of sufficient protrusion from the back wall to support a nest, but sufficiently narrow to discourage predation by large gulls. A concise overview of the key ecological criteria important for designing potentially 'optimal' kittiwake nesting habitat is presented within the Hornsea Three Kittiwake Artificial Nesting Structure Pattern Book (LDA Design, 2021). Those key ecological criteria are summarised in Table 10.1 below which incorporates importance in the design approach (essential to consider or important in optimising success) and whether they are relevant to onshore or offshore ANS (or both). Final design may also accommodate the provision of other species (such as guillemot) if required at a project level. As provision for other species was not required for the Round 4 Plan, it is not discussed further within this KSCP.

Table 10.1 Key ecological criteria considered important when planning ANS design (LDA Design, 2021)

Ecological Feature	Description	Importance
Structure	High and steep sided structure with a near vertical back wall and narrow horizontal ledges.	Essential
Ledge size	Adequate ledge dimensions: horizontal ledges 200mm width; length per pair from 300mm (working length 400 mm).	Essential
Back wall height	Height between ledges at a minimum of 400 mm and maximum of 600 mm.	Essential
Roof	Overhang / roof to help protect against weather conditions and additional predator deterrent. Roof pitch in excess of 25 degrees can be used to deter nesting.	Optimise success
Ledge overhang	Vertical wall designed to create nesting ledge overhangs sufficient to minimise lower ledge fouling by droppings and potential for reducing avian predation risk.	Optimise success

Spray zone	Nesting ledges located above the level of highest astronomical tide and beyond the reach of wave action.	Essential
Ledge height – exposed sea frontage	Minimum height if at exposed waterfront location. 5-20 m (above HAT site dependent); above wave height/ splash zone of HAT predicted for 2050, accommodating for sea level rise (in > 50 years).	Essential
Appropriate aspects	Majority of nesting ledges should not be south-facing. If this is not possible, ledges should be facing multiple aspects. Shelter from prevailing wind may also need consideration.	Essential
Partitioning	Walls/partitions between groups of nests. To facilitate an experimental design, each structure should have alternating rows with and without compartments. The order of alternation should be different on adjacent faces. Design should allow for easy addition/removal of partitions.	Optimise success
Avian predator control	Inaccessible to avian predators with special attention paid to top of ANS and nesting ledge depths; additional anti-predation features may be required but any features must be integrated with ANS design and context.	Essential
Attraction	Capacity for addition of decoy nests/birds and audio systems to play kittiwake calls to attract birds. These items will no longer be required once the colony is inhabited, so they should be removable or concealed within the design.	Essential

10.1.2 The information presented above provided the foundations to inform design for the fully implemented (in summer 2022) Hornsea Three nearshore kittiwake ANS and has been fundamental in informing the Hornsea Four (Ørsted, 2021) offshore ANS design approach. Furthermore, a number of other OWF projects pursuing ANS (as conveyed by Table 5.2) have also followed a similar approach. Such an approach has also been through the stakeholder review during the previous project engagement processes. It therefore forms a robust framework of established design principles to base the Round 4 offshore SANS upon, while also allowing a degree of flexibility to account for further planning considerations. Final design will be agreed with the Steering Group post-consent to maintain flexibility which will be dependent on final location.

10.1.3 Approaches to the designs and potential proposals for a Round 4 offshore SANS were presented and discussed during Steering Group meetings. Overall, the Steering Group members agreed that the design principles were ecologically suitable and appropriate to inform the design of Round 4 offshore SANS.

10.1.4 As a result of the significant work undertaken by previous OWF projects, and the approach to gathering Steering Group agreement, this section of the KSCP has shown an offshore SANS for Round 4 can be designed based on evidence-derived, ecological design principles and can be implemented onshore (Norfolk Boreas and Vanguard) and within the marine environment offshore (as shown by Hornsea Three and proposed by Hornsea Four). This therefore provides confidence that post consent Steering Group discussions will refine the design process based on the principles above to determine a suitable design for the agreed offshore SANS location.

10.2 Monitoring considerations that may inform design

10.2.1 In addition to the above, the Round 4 Steering Group also considered important design aspects to permit monitoring of the SANS (also consistent with previous and implemented projects as detailed in LDA Design, 2021). The Steering Group agreed the following should be incorporated into the Round 4 SANS design in addition to those considered in Table 10.1:

- Internal access to SANS with subsequent access to nesting ledges to permit monitoring (if determined feasible on health and safety grounds);
- An external power source (such as solar panels and battery storage) to support remote monitoring (further detail related to monitoring is presented within Section 12).

11 Delivery Mechanism

11.1 The Proposal

11.1.1 For offshore SANS there are a number of delivery options being considered by the Steering Group. In order of ecological preference these are (noting that other factors, such as cost, will need to be weighed up in the final decision):

- The construction of two offshore SANS;
- The construction of an additional two tiers (which equates to between approximately 500-1500 nesting spaces) of nesting structures to Ørsted Hornsea Four offshore kittiwake structure and consideration of one additional standalone offshore SANS;
- The construction of an additional two tiers (which equates to between approximately 500-1500 nesting spaces) of nesting structures to Ørsted Hornsea Four offshore kittiwake structure and

consideration of one additional standalone offshore SANS as part of adaptive management; and

- The construction of an additional two tiers (which equates to between approximately 500-1500 nesting spaces) of nesting structures to Ørsted Hornsea Four offshore kittiwake structure and one onshore SANS.

11.1.2 The construction of two offshore SANS was preferred by the Steering Group to provide mitigation of risk of failure at one offshore SANS. Within this there was an ecological preference that these were in different locations, however it was agreed by the Steering Group that when considering the balance of economics that the two structures near to each other was perfectly acceptable.

11.1.3 An option to add to Ørsted's offshore kittiwake structure as one of the structure options was also deemed as suitable.

11.1.4 With regard to the staggering of delivery of two offshore SANS, a number of recent projects implementing artificial nesting structures for kittiwake (listed in Table 5.2) have been required to deliver compensation four breeding seasons prior to impact (or referred to as operation of wind turbine generators). The Steering Group agreed that there is a likelihood of a reduction in the number of breeding seasons required before delivery of the measure to be reduced from four if there is evidence that the overall delivery of the compensation measure and 'payback' time is not significantly affected by the proposed approach. Depending on the approach taken to delivery (including final scale determination), such evidence will be developed in line with Steering Group expectations and presented within the KSIMP. Furthermore, the delivery of R4 SANS could be staggered along different implementation timescales. This would also be informed by the delivery option and supporting evidence will be provided within the KSIMP.

11.1.5 Consideration was given to deployment of a second structure only as a form of adaptive management but this was not deemed preferable due to the potential for the accumulation of mortality debt. Upfront planning of two offshore SANS even if construction is staggered was therefore preferred and well supported by the Steering Group.

11.1.6 The Steering Group did not favour onshore structures for this Plan level compensation due to the number of appropriate onshore structures which are already built or planned from previous or current offshore wind farm compensation projects and the anticipated benefits of offshore nesting locations (see description in section 5.3). It was also highlighted during Steering Group discussions that suitable onshore locations to build an ANS are lacking and potential challenges associated with navigating local planning processes.

11.1.7 If one or more of the three projects (DBSW, DBSE or ODOW) were to not proceed, the option of delivering two offshore SANS would be revisited by the Steering Group to determine its suitability in light of a reduced impact on kittiwake as a result of fewer collisions. For example, if the Steering Group agree that only one structure would be appropriate as a result, then the remaining project(s) would apply for a variation to the dML, or change to their DCO. Other options will be explored post-consent.

11.2 How will this be secured?

11.2.1 Once this KSCP has been adopted, DCO applications can be submitted by the developers of the Round 4 projects and the compensatory measures identified in those applications will accord with the

agreed KSCP and it can be expected that those measures can be included as requirements of any DCO that is made.

11.2.2 Under the agreements for lease with The Crown Estate, developers of DBSW, DBSE and ODOW must participate in the processes required by this KSCP and comply with, undertake and maintain (as necessary) the compensatory measures required to be adopted pursuant to this KSCP. The KSIMP (which is a requirement of the KSCP and will provide further detail on the delivery and implementation of the measures) will dictate which measures will be undertaken, where, how and other specifics. The KSIMP will secure the funding and ensure the benefits are shared across the Plan and do not remain with any individual developer, regardless of who has undertaken the build. The KSIMP will also set out all the necessary agreements between The Crown Estate and the developers of DBSW, DBSE and ODOW necessary to deliver the offshore SANS. Costs will be shared between the developers of DBSW, DBSE and ODOW and this will be agreed in advance of commercial agreements being agreed. Monitoring will be specified in the KSIMP and coordinated to ensure consistency across the Round 4 plan or in line with other parties (for example, if the Ørsted structure option was pursued). It will ensure that the data is collated and presented at a plan level and not separately on a project by project basis. The KSIMP will require developers to comply with the detail set within the DCO or Deemed Marine Licence (dML) condition.

11.2.3 The Crown Estate will continue to chair the Steering Group following the submission of DCO applications for DBSW, DBSE and ODOW. Examiners Questions related to this KSCP during the DCO process following the submission of the KSCP should be directed to the relevant project applicant who will then provide those questions to TCE to ensure consistent alignment of responses which take account of Steering Group discussions and responses. It is requested that due to the requirement of input of the Steering Group the Examiners put forward Written Questions where practicable. The Steering Group will be responsible for providing oversight of delivery, and of the responses related to the DCO process regarding the KSCP, reviewing monitoring data and if applicable identifying adaptive management measures. The Terms of Reference for the KSCP Steering Group still apply following DCO submission and until the Steering Group is dissolved in accordance with those Terms of Reference.

12 Monitoring

12.1.1 The primary role of monitoring is to demonstrate the success of the measure and inform potential adaptive management interventions. The success of the measure is to provide the required number of adult kittiwake into the meta-population (which in turn resources the FFC SPA population) per annum at a scale which will offset the impacts of DBSW, DBSE and ODOW projects combined. The approach to determine the scale of compensation is described within Section 8, which presents an example based on the interim Plan Level impact of 108 kittiwake per year. This figure will be updated following the determination of impacts to kittiwake at FFC SPA at a project level.

12.1.2 Core monitoring will focus on determining success of the measure and will include:

- Colony counts;
- Productivity monitoring;
- Colonisation rate; and
- Monitoring natal dispersal.

12.1.3 Monitoring for the Round 4 strategic compensation will commence from the breeding season following implementation of the Round 4 offshore SANS. Monitoring at nearby existing colonies (which will be defined with agreement of the Steering Group post-consent) and those associated with the Round 4 offshore SANS will also continue post-construction and throughout the operational phase of DBSW, DBSE and ODOW projects to measure the success of the Round 4 offshore SANS, identify barriers to success and inform whether adaptive management measures should be considered. Round 4 Plan monitoring will look to compliment the ongoing compensation monitoring undertaken by other developers and therefore utilise data (where possible) collected by other projects from relevant onshore/ nearshore colonies (both natural kittiwake colonies and ANS colonies). Detailed monitoring plans will be developed following consent (and alongside factors such as the design aspects of the Round 4 offshore SANS to permit certain monitoring approaches and requirements). However, the below sections detail what is likely to be considered the 'core' monitoring requirements required to evidence the success of the compensatory measure.

12.1.4 The following sections set out what is currently feasible with regard to monitoring at this stage of the compensation process to demonstrate success and inform adaptive management. The Steering Group will determine the exact methods of each relevant monitoring component following publication of the KSCP.

12.2 Survey methods

12.2.1 Data collection will be carried out by at least two trained observers utilising survey platforms from which data can be gathered and will be dependent on the location and design of the Round 4 offshore SANS and nearby colonies to be surveyed. Offshore SANS would require boat-based visual observations with consideration of using remote sensing techniques to allow complete coverage of the colony for counts and productivity monitoring. Other methods (such as remote monitoring or other innovative new technologies) will be explored in detail post consent depending on the DCO requirements and available technology and support from the Steering Group.

12.3 Colony counts

12.3.1 A minimum of one full colony count will be made annually at the Round 4 offshore SANS and nearby colonies, during the latter half of the incubation period (mid-June), when numbers of nests are most stable (see Table 12.1for survey programme). The count unit for kittiwake is Apparently Occupied Nest (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 (trace nests are defined as per the seabird monitoring handbook (Walsh *et al.* 1995): site-holding birds with even a trace of a nest). At the Round 4 offshore SANS and nearby colonies to be surveyed, the total number of AONs and nesting attempts (trace nests) will be recorded on each productivity visit (see below section). If applicable (i.e., at all Round 4 offshore SANS 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.

12.4 Productivity monitoring

12.4.1 Productivity will be monitored using the mapped nests method (method 1 in Walsh *et al.* (1995)). It is intended to monitor all nests on all Round 4 offshore SANS and nearby colonies to be surveyed (see Table 12.1 for proposed survey programme). A minimum of three surveys to record nest contents for productivity calculations will be made each year. First and second surveys 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 survey using the recording codes of Walsh *et al*. (1995). On a third survey (close to estimated time of first chicks fledging, generally early to mid-July) all nests recorded in the first survey will be rechecked. Additional surveys 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 survey 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), 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.

Table 12.1 Expected survey programme for Round 4 Strategic Artificial Nesting Structures

Month	Colony Count (number of surveys)		Productivity (number of surveys)	
	ANS	Neighbouring Colonies	ANS	Neighbouring Colonies
Late May – early June (incu-bation)			✓ (1)	✓ (1)
Mid-June (peak incubation/ early chick stage)	✓ (1)	✓ (1)	✓ (1)	✓ (1)
July – ~early August (chick rearing / fledging)			✓ (1+)	✓ (1+)

12.5 Colonisation monitoring

12.5.1 Once the Round 4 offshore SANS 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. Following discussion with the Steering Group, 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.

12.5.2 The intensity and type of monitoring activities undertaken for the 'core' requirement for baseline monitoring, 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 Round 4 offshore SANS and therefore the most suitable monitoring, as identified by the Steering Group, will be undertaken.

12.5.3 Monitoring will be designed to enable identification of factors which may inform adaptive management (such as why some areas of the SANS may undergo lower rates colonisation). This is likely to involve environmental information, such as sun and wind exposure, which will be determined once the final design of the structure has been agreed with the Steering Group post-consent.

12.6 Monitoring of natal breeding dispersal

12.6.1 The aim of the compensation is to produce a specified number of adult kittiwake into the species meta-population. The Steering Group has explored this consideration and how it could be monitored as part of Steering Group discussions. It is the consensus of the Steering Group that it is not possible to quantitatively measure natal dispersal with current technologies. 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 Round 4 offshore SANS. Ringing chicks with uniquely engraved colour-rings allows individuals to be re-sighted in subsequent years which will provide 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 Round 4 offshore SANS and therefore their overall contribution to productivity. It is possible that new technologies or attachment methods may be developed during the timescales involved in Round 4 projects, 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 post-consent Steering Group. This is in line with previous DCO decisions for other ANS proposed as compensation.

12.6.2 To qualitatively assess natal dispersal, colour ringing of chicks will be undertaken at Round 4 offshore SANS where it is practicable and safe to do so. Due to the risks associated with accessing offshore structures, commitment to access offshore SANS will be decided on final design and in discussion with the Steering Group post-consent. If undertaken, these data will allow for determination of natal dispersal rates from the Round 4 SANS caveated by the use of generic survival rates (e.g. Horswill and Robinson, 2015) as a proxy for site-specific survival rates. Systematic re-sightings of individuals colour-ringed as chicks at the natal Round 4 offshore SANS will provide for an estimation of natal philopatry. Any re-sightings of colour-ringed birds away from the Round 4 offshore SANS 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 the Round 4 strategic compensation measure monitoring at the Round 4 offshore SANS. All such re-sightings by other persons, whether as part of other studies not commissioned by Round 4 strategic compensation 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 Round 4 compensation monitoring and reporting.

12.7 Additional monitoring

12.7.1 The opportunity to monitor birds at artificial breeding colonies provides potentially exciting opportunities to study kittiwake intimately and develop and test new and novel monitoring techniques. This may include increasing understanding factors such as diet analysis and data on demographics and phenology. For the purposes of this KSCP, monitoring has focused on what could be considered the 'core' elements to evidencing the success of the measure (Section 12.3-Section 12.6). Additional monitoring considerations, or furthering understanding on kittiwake meta-

population dynamics (for example), will be explored post-consent following further detail of design and location, or via strategic compensation groups such as OWIC or via the Offshore Wind Evidence and Change (OWEC) Programme.

12.7.2 Approaches to the monitoring for a Round 4 offshore SANS were presented and discussed during Steering Group meetings. Overall, the Steering Group members agreed that the monitoring principles were ecologically suitable and appropriate to support the Round 4 offshore SANS.

13 Adaptive Management

13.1.1 The compensatory measure will be implemented once the construction of the Round 4 offshore SANS and/or the construction of the additional tiers to the existing structure has been completed. Adaptive management will be considered after the DBSW, DBSE and ODOW projects become operational. The Round 4 strategic compensation method will adopt a pragmatic approach to determine whether adaptive management actions are necessary before DBSW, DBSE and ODOW are operational. The Steering Group will discuss if adaptive management is required post-approval of the KSCP.

13.1.2 Adaptive management is an iterative process that combines management measures with ongoing monitoring to enhance the effectiveness of the measure, while also updating knowledge and improving decision-making over time. Adaptive management will play a crucial role in the compensatory measures, serving as a tool to address unexpected issues or deviations from the anticipated outcomes of the compensation, such as a low colonisation rate of the structure.

13.1.3 Due to the detailed approach to design and site selection, it is expected that the offshore SANS will not need any significant management actions beyond general structure maintenance during the lifetime of the projects. However, it is essential to remain alert to unforeseen events that may necessitate adaptive management, such as a lack of colonisation despite careful site selection, or a predation risk from avian predators, for example. The Round 4 compensation aims to mitigate all foreseeable risks as much as possible through sound design of the ANS and planned maintenance.

13.1.4 Measures that have been discussed with the Steering Group in relation to the potential adaptive measures include:

- Extension of ANS to facilitate further nesting spaces which will include the provision of additional nesting structures if capacity in one location is exceeded;
- Provision of nesting material in proximity to the structure;
- Application of predator deterrents – such as changes to design to prevent large gulls perching on nesting structure;
- Provision of additional protection from elements – for example, shielding from the sun or prevailing wind;
- Ability to adjust size of compartments between each kittiwake nesting space or orientation of nesting locations;
- Provision of trace nests to encourage colonisation;
- Support to increase kittiwake recruitment – such as using decoys and playback;
- Relocation of the nesting structure to repurposed structure (such as an oil rig) (if deemed technically feasible) – likely as a worst case scenario following exhaustion of other adaptive management measures;

- Management of fisheries of important seabird prey to increase availability; and
- Use of the proposed Marine Recovery Fund or similar strategic route, if available.

13.1.5 The likely trigger points for the application of adaptive management will relate to:

- Population trends (at SANS and of the wider population);
- Colony establishment rates; and
- Productivity trends (at SANS and of the wider population).

13.1.6 Adaptive management thresholds will be informed by monitoring of the Round 4 offshore SANS. The link between specific adaptive management actions and how they will be informed by monitoring has been presented to Steering Group members and it was agreed that ongoing consultation on the need for adaptive management will be undertaken with the Steering Group post Round 4 offshore SANS construction. The monitoring of the above three drivers (breeding population, colony establishment and productivity (Section 12)) will be able to inform decisions relating to adaptive management. Some factors may be beyond the control of DBSW, DBSE and ODOW and may therefore not trigger adaptive management measures. This process will be informed by the monitoring process detailed in Section 12.

13.1.7 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 offshore SANS). At this stage, quantitative trigger points would only permit hypothetical and therefore potentially incorrect timescale estimates. A more appropriate approach, which has been agreed within the Steering Group, is presented in Figure 13.1. 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 baseline conditions at the offshore SANS and neighbouring kittiwake colonies, as well as data and trends at a wider regional and national level.

13.1.8 If necessary, this process will inform the most appropriate response in terms of adaptive management. As the monitoring of the Round 4 offshore SANS and the associated kittiwake nesting progresses, additional adaptive management options may emerge and will be further examined. If relevant, Steering Group members will be informed, and agenda items will be established for the Steering Group meetings. It should be noted that kittiwake populations exhibit varying degrees of fluctuation and it will therefore be important to ensure any issues with the Round 4 offshore SANS are placed in context with regional kittiwake breeding success before adaptive management actions are implemented. Final adaptive management options and approaches will be refined post-consent following agreement of key specifics of the compensatory measure (such as final design and location and whether delivery is linked to Ørsted ANS proposals). This information will be agreed with the Steering Group and presented within the KSIMP (an outline of which is provided within Appendix A). An overview of the adaptive management approach is provided below in Figure 13.1.

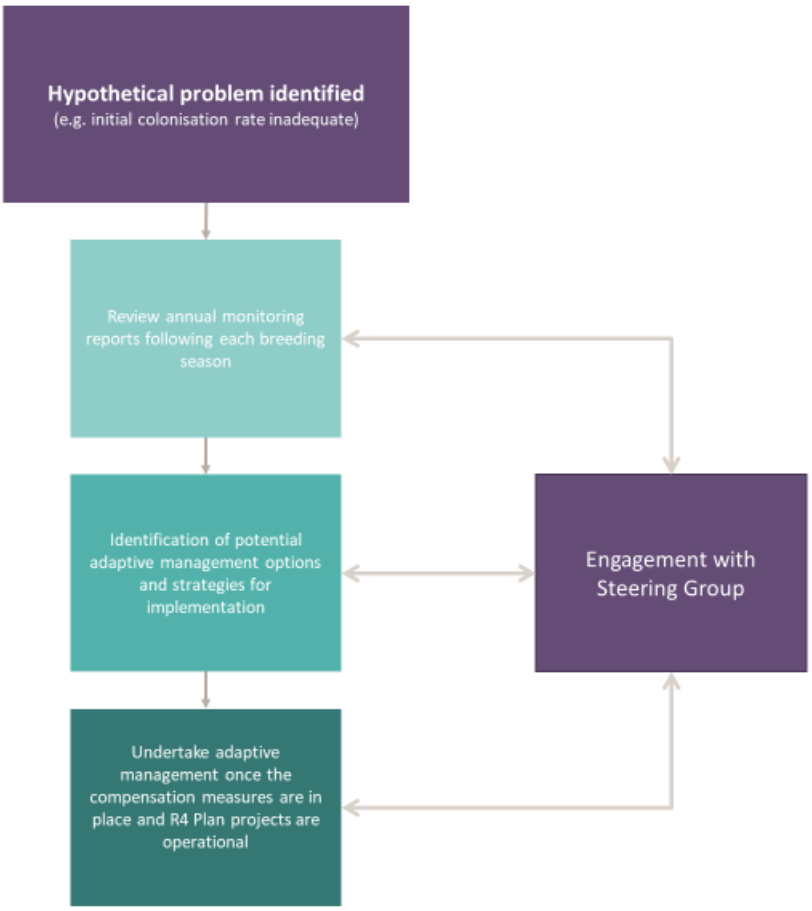

Figure 13.1 Overview of adaptive management approach

13.1.9 Throughout the Round 4 offshore SANS' lifespan, monitoring may identify a surplus or deficit of kittiwake relative to the required compensation number of adult kittiwake per annum. If such a discrepancy arises, it will be taken into account when calculating each year's success criteria and potential linkages with other strategic compensation measure (if deemed appropriate) may be explored.

13.1.10 Approaches to adaptive management for a Round 4 offshore SANS were presented and discussed during Steering Group meetings. Overall, the Steering Group members agreed that principles were ecologically suitable and appropriate to support the Round 4 offshore SANS.

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15 Signatories

15.1.1 The below signatories, all members of the Kittiwake Strategic Compensation Plan Steering Group, confirm that this Kittiwake Strategic Compensation Plan has been developed in accordance with the agreed Terms of Reference for the Steering Group. Where an individual member does not agree with the content of parts of the Plan, this is documented in the Agreements Log, which should be considered as part of the Plan.

Organisation	Named Signatory	Signature	Date
Steering Group Chair – The Crown Estate	Ed Salter	DocuSigned by: [redacted] 9EC6576397034FA...	08 February 2024
The Crown Estate	Ben Lander		07 February 2024
Department for Environment, Food and Rural Affairs (Defra)	Lucie Guirkinger		08 February 2024
Department for Energy Security and Net Zero	Trevor Raggatt		06 February 2024
Natural England	Martin Kerby		07 February 2024
JNCC	Karema Randall		08 February 2024
Outer Dowsing Offshore Wind	David Few		07 February 2024
RWE	Colin McAllister		07 February 2024

DocuSign

Certificate Of Completion

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Authentication Details SMS Auth: [redacted] **Electronic Record and Signature Disclosure:** Accepted: 06 February 2024 | 16:12 [redacted]		

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Ed Salter [redacted]@thecrownestate.co.uk Mr Security Level: Email, Account Authentication (None), Authentication	DocuSigned by: [redacted] 1735F8780692456... Signature Adoption: Pre-selected Style Using IP Address: [redacted]	Sent: 08 February 2024 | 17:23 Viewed: 08 February 2024 | 17:26 Signed: 08 February 2024 | 17:36

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Envelope Sent	Hashed/Encrypted	06 February 2024 | 16:11
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Offshore Wind Leasing Round 4

Kittiwake Strategic Compensation Plan Appendix A – Outline Kittiwake Strategic Implementation and Monitoring Plan

The Crown Estate

Date: 27th September 2023

43569_NIRAS_REP_003_v1.2

Rev.no.	Date	Description	Prepared by	Verified by	Approved by
1	01/09/23	Draft template	FRCA	SPAC	SPAC
1.1	27/09/23	Revised following TCE & TL reviews	FRCA	SPAC	SPAC
1.2	27/11/23	Revised following TCE & TL reviews	FRCA	SPAC	SPAC

Contents

1 Introduction

1.1.1 This document sets out the outline for the Kittiwake Strategic Implementation and Monitoring Plan ("KSIMP") that will be developed by the Offshore Wind Leasing Round 4 Plan (**"**Round 4**"**) strategic steering group for kittiwake compensation (the "Steering Group") should consent for the Round 4 Dogger Bank South West ("DBSW"), Dogger Bank South East ("DBSE") and Outer Dowsing ("OD") projects be granted. The KSIMP will be developed in accordance with the Kittiwake Strategic Compensation Plan ("KSCP"), of which this document is an Annex, which provides a detailed account of the strategy supporting the potential compensation measures for kittiwake. The KSIMP will be a requirement of the DCO and will need to be submitted to the Secretary of State for approval. If other compensation measures are approved for the Round 4 Plan, a relevant KSIMP will be developed in a similar style to this artificial nesting specific example.

1.1.2 The following sections of this document set out the proposed content of the KSIMP. The KSIMP will be structured as follows:

- Section 1: Introduction
- Section 2: Background
- Section 3: Consultation
- Section 4: Strategic artificial nesting structure
  - Section 4.1: Scale and location of compensation
  - Section 4.2: Design of artificial nesting structure
  - Section 4.3: Routine management
  - Section 4.4: Delivery Mechanism
  - Section 4.5: Commercial Agreements
  - Section 4.6: Monitoring and adaptive management
  - Section 4.7: Reporting
  - Section 4.8: Programme for implementation and delivery
  - Section 4.9: Discharge of consent condition

2 Background

2.1.1 This section will provide context to the KSIMP, confirming the reason for its need, its aims and objectives, and the latest project status.

3 Consultation

3.1.1 This section will summarise all relevant consultation that has taken place through the Steering Group process in the development of the KSIMP. It will capture any key decisions, agreements, and where relevant any outstanding issues under discussion (with clarity as to the steps necessary to resolve any such matters). Ongoing engagement, for example to provide updates on monitoring, (post-discharge of the KSIMP) will be outlined here.

4 Scale and location of compensation

4.1.1 This section will identify the scale of compensation proposed to be provided and how this relates to the consent decision made by the Sectary of State. This section will then also detail the specific location(s) at which the compensation will be delivered and how the necessary seabed rights and/or property rights in those locations have been/will be secured. The evidence base included in support of the KSCP will help inform these aspects. The results of any monitoring of existing kittiwake colonies carried out pre-construction will also be detailed here as this may influence the location(s).

5 Design of artificial nesting structure

5.1.1 This section will identify the design for each structure provided within the compensation package, including the high-level structural design and the kittiwake ecological design considerations which have been integrated to ensure the compensation measure has the maximum potential for success (including alterations to the topside of repurposed structure). The evidence base provided in support of the KSCP and engagement with the Steering Group will be important in informing the specific design aspects of the structure.

6 Routine management

6.1.1 This section will describe the management responsibilities for the structure, including anticipated routine maintenance.

7 Delivery Mechanism

7.1.1 This section will confirm the nature and status of all consents, land or seabed access agreements, as well as any other relevant approvals and/or funding arrangements that are necessary to secure the implementation of the compensation measures and include a programme for delivery of any outstanding consents.

7.1.2 This section will also outline key members involved in the delivery, their role in the process and responsibilities associated with implementation.

8 Commercial Agreements

8.1.1 If a decision is made to repurpose an existing offshore platform that is due to be decommissioned then this section will provide a high level summary of the agreement with the relevant oil and gas operator. Furthermore, this section may also include agreements between parities to ensure the implementation of the measure.

9 Monitoring and adaptive management

9.1.1 This section will identify the monitoring and adaptive management principles and processes that have been agreed with the Steering Group, including the scenarios under which adaptive management measures are required. It will be developed in line with the evidence base that has been provided in support of the KSCP. Following discharge of the KSIMP, the Steering Group will be engaged in relation to implementing adaptive management if required as outlined in the Consultation section above. Specific topics of discussion for inclusion within the Steering Group, and therefore the purpose of the group, will be regarding site selection, project/ study design, monitoring, adaptive management options and associated triggers. The focus of the Steering Group will be specifically to deliver the compensation for DBSW, DBSE and OD and therefore other topics beyond this will be out of scope for the KSIMP.

10 Reporting

10.1.1 This section will set out the reporting requirements associated with the monitoring and adaptive management. In doing so, it will confirm the necessary objectives and timescales for the reporting.

11 Programme for implementation and delivery

11.1.1 This section will confirm the programme for the implementation and long-term delivery of the compensation.

12 Discharge of consent condition

12.1.1 This section will confirm how, based on the content of this report, the Secretary of State can discharge the condition relating to the delivery of the compensation required for the kittiwake feature of the Flamborough and Filey Coast Special Protection Area.

Department for Business, Energy & Industrial Strategy

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Dan Labbad
Chief Executive
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15 July 2022

Dear Dan,

The Crown Estate's Fourth Seabed Leasing Round: Habitats Regulation Assessment

I refer to The Crown Estate's letter of 20 April 2022 on the Plan Level Habitats Regulations Assessment for the Fourth Seabed Leasing Round. I am content that The Crown Estate has fulfilled its obligations under regulation 64 of the Habitats Regulations 2017, and regulations 29 and 30 of the Conservation of Offshore Marine Habitats and Species Regulations 2017. I am content that The Crown Estate has appropriately assessed the impacts of the plan on the protected sites within the National Site Network that may be affected and am content for the plan to proceed subject to the condition set out in this letter.

I am satisfied that an appropriate evaluation of alternative solutions has been carried out and we accept that there are no alternative solutions to the preferred options that would have a lesser effect on the integrity of the sites in our National Site Network, whilst meeting our decarbonisation and renewables ambitions under the British Energy Security Strategy (BESS).

There is also a strong case to justify the anticipated damage to sites within the National Site Network on grounds of imperative reasons of overriding public interest, based on the importance of dealing with climate change and meeting our decarbonisation and renewables ambitions, and more recently the need for energy security.

I note that it has been difficult to provide the level of detail necessary to identify all potential impacts and that where this is the case, further assessment has been deferred to the project level HRAs, where further assessment, and consultation will take place with Government, Statutory Nature Conservation Bodies (SNCBs) and environmental NGOs.

I understand that impacts on the Dogger Bank SAC and Flamborough and Filey Coast SPA will be compensated through developing compensation plans for each of the affected sites. However, I note that a lack of certainty on the efficacy and longevity of certain measures was raised by some respondents to The Crown Estate's consultation. I am encouraged that you will be exploring a suite of potential compensation measures to ensure there is the flexibility needed to develop effective compensation. I am also supportive of the steering groups being set up for each

compensation plan, with a condition added to developer's Agreement for Lease (AfL) that agreement of the compensation plan within each steering group is required before submission of DCO applications. I note that both BEIS and Defra will be invited to participate on the steering group for each compensation plan. This is essential so Government understands future compensation needs, potential opportunities and allow us to ensure that the compensation packages can learn from ongoing research programmes such as OWEC (Offshore Wind Evidence and Change Programme) and align with the new policies and arrangements being developed under the British Energy Security Strategy, such as the Offshore Wind Environmental Improvement Programme.

Given the uncertainty in the efficacy and longevity of certain compensation measures, monitoring will be essential to ensure the measures are working, and adaptive monitoring will be required if the initial measures do not work as planned. A condition of my approval is:

- The Terms of Reference for each steering group require the steering group to monitor each measure and the compensation plan as a whole, at intervals that experts within the steering group consider appropriate,
- Require the steering group to put in place adaptive management if necessary,
- Require the steering group to take into account any recommendations from the advisory group, and
- Require the steering group to take into account wider Government policies (such as requirements within the BESS) when monitoring and adapting.

My Department is happy to work with The Crown Estate on the practicalities of undertaking this monitoring review as part of our membership on each steering group.

On the basis of the condition proposed above, I am content that appropriate steps have been taken to ensure that compensatory measures will be in place to offset predicted losses to the Dogger Bank SAC and the Flamborough and Filey Coast SPA. Consequently, I can confirm that BEIS has no objections to The Crown Estate's approval of the Strategy.

Yours sincerely,

[redacted]

RT HON KWASI KWARTENG MP
Secretary of State for Business, Energy & Industrial Strategy

ID	Topic area	Agreement	Comments	JNCC	NE	DEFRA	DESNZ	RWE	ODOW	TCE	Decisions/ response by TCE
1	Compensation options	The group agreed the two options to pursue in parallel as option A & B are: artificial nest structures and management of fisheries to improve prey availability	Discussed & agreed during SGKM3 on 28/03/2023	Agreed (31/10/23)	Agreed (22/5)	Defra noted practical concerns that would need to be taken into account around the delivery of any fisheries management measures. (LG 30/01/2024)	agreed (24/05/23)	Agreed, PDB (19/5/23)	RHF (22/05/23)	Agreed (BL) (19/06/2023)	No response required
2	Delivery	The group agreed strategic compensation was preferred noting a few caveats needed to be considered	Discussed & agreed during SGKM3 on 28/03/2023	Agree that strategic implementation would be perferable. Agree with NE that the funding and delivery mechanisms are currently uncertain. (31/10/23)	Clear advantages but also areas of uncertainty regarding implementation mechanism that need addressing (22/5)	Agreed (PL) (24/5)	Agreed (01/11/23)	Agreed, PDB (19/5/23)	Agree in principle but suggest wording required to set out cavates. (19/5/23)	Agreed (BL) (19/06/2023)	No response required
3	Design	The group agreed with the ANS design requirements required for Kittiwake (as per presented in the slides of M5 and are taken from Hornsea Three pattern book produced by LDA designs). (nice to have design elements e.g. additional monitoring design to be discussed seperately)	Discussed & agreed during SGKM5 on 24/05/2023	Agree with general design requirements. However, while ANS have been accepted as compensation for impact on Kittiwake at project level, these are newly installed and assumptions around colonisation rates, productivity, dispersal and constribution to SPA and wider populations etc are untested. Do not agree that designing in the ability to monitor (including access for tagging etc) from the outset, is 'nice to have'. (31/10/23)	ANS design requirements are generally acceptable as agreed on 24/5, however we do not consider ensuring robust monitoring is 'nice to have' as understanding the performance of the ANS is needed to identify if adaptive management is needed (19/6)	Agreed, but also agree with SNCB that monitoring is needed. (LG 23/01/2024)	Agreed, but also agree with SNCB comments on nice to have and monitoring. (01/11/23)	We are content with the design criteria laid out in the draft plan (30/10/23)	Agreed. JL (12/6/23)	Agreed (BL) (19/06/2023)	The Crown Estate note that Government and SNCB's raise that monitoring should not be considered 'nice to have', but consider this agreement is with regards to design elements discussed within the Steering Group. It is agreed that monitoring is a vital constituent of a compensatory measure to allow for success to be identified and adpative management to be implemented where required, but that the 'nice to have' design elemts may allow for additional monitoring, or different monitoring techniques, above what is considered suitabel and robust.
4	Compensation options	The group discussed the option of management of fisheries to increase prey availability. While there is uncertainty on delivery for compensation, the group agreed it should be included as a measure on the basis there is still prospect it could be a delivered as compensation. The group had previously agreed, and continued to agree that this is the 'best option' in terms of benefits to kittiwake, despite the inherent difficulties in monitoring and quantifying the benefit. It was agreed there was limited benefit of trying to advance the evidence base supporting the measure within the timelines available for the R4 Plan compensation proposals and focus should be spent on trying to develop a case which can be included within the kittiwake compensation plan (the overarching	Discussed & agreed during SGKM6 on 21st June 2023	Agreed (31/10/23)	Agreed (31/10)	We disagree that fisheries management should be used as a compensation measures as there is uncertainty in the predicted scale and timescale of recovery of seabirds and it is uncertain it would be enough to compensate for offshore wind impacts on seabird populations. A decision on using fisheries management as compensation is dependent on approval by Defra SoS. The text under Agreement column C does not reflect the latest changes going from 'best' measure to 'most ecologically beneficial (LG 25/01/24)	Agreed. Noting the recent consultation in England and Scotland, there may also be merit in looking at monitoring of any potential closures as part of a package of measures (hopefully to inform on future headroom) (01/11/23)	We are content with the text that appears within the draft plan as this keeps the option in play should decision-makers change stance in future (30/10/23)	JL 21/7/23. Agree in principle- noting that level of detail/time spent on this should not impact on delivery of plan to programme given the uncertainities around the measure. Focus should not be on non-essential elements if time is limited.	Agreed (BL) (20/07/2023)	The Crown Estate note Defra's view on fisheries management measures being included in the plan. Fisheries management was agreed to be the most ecologically beneficial compensatory measure identified by the Steering Group by the majority of members, in line with the decision making mechanism in the agreed Terms of Reference. The plan acknowledges that any measures implemented for Round 4 compensation must be 'additional', and also acknowledges uncertainty in delivery given the recent Defra consultation on sandeel management for other puproses, and goes on to identify offshore artificial nesting structures and a viable and deliverable alternative.
5	Compensation options	The group agreed that prey supporting habitat measures to increase prey availability for kittiwake were good to have as part of a package and that discussions would now look to focus on how benefits could be incorporated.	Discussed & agreed during SGKM6 on 21st June 2023	Agreed (31/10/23)	Agreed though not a priority (31/10)	As noted in the row above, we do not agree that fisheries management should be used as a compensatory measure (LG 30/01/2024)	Agreed (01/11/23)	Agreed in principle. It should be noted that areas proposed for extension of the DB SAC for compensation purposes would encompass known sandeel fisheries (see email from PP to Sara 24/08/23 for links) (30/10/23)	JL 21/7/23. As above. Agreed in principle. Focus should be on delivery of a functional plan to programme which allows DCO submssion. Focus should not be on non-essential elements if time is limited.	Agreed (BL) (20/07/2023)	No response required
6	Monitoring	design are related to access, power (for monitoring, for example) and human safety	during SGKM6 on 21st June 2023	Agreed (31/10/23)	Agreed (31/10)	Agreed (LG) 22/11	Agreed (01/11/23)	Agreed (30/10/23)	Agreed JL 21/7/23	Agreed (BL) (20/07/2023)	No response required
7	Quantum	The method of quantum to be used will be the "new colony approach 2". It is noted there is still a question on which WCS paramters to use and any requirement for apportioning back to FFC SPA, but these will be covered in separate line items post further discussions	Discussed & agreed during SGKM7 on 2nd August 2023	Agreed re calculation method.The compensation target (i.e. the parameters used to calculate this using the agreed method) is not yet agreed and requires further discussion. (31/10/23)	Agreed re calculation method. Emphasise need for further discussions around how to generate compensation targets off the back of that calculation method, including how impacts of the 3 projects will be agreed and fed in (31/10)	Agreed as per SCNB comments (08/01 - LG)	Agreed - as per SNCB comments (01/11/23)	We maintain the position that the Hornsea 4 approach is our preferred option and that both the Hornsea 3 and Hornsea 4 method and results (i.e. no. of pairs delivered) should be presented in the plan. This will allow the SoS to make an informed decision having weighed the arguments from the examination. Providing the number of structures and a range of pairs delivered provides the necessary detail to all parties about what will ultimately be delivered. We are therefore content with the presentation of the data provided by RWE and ODOW in Table 7, noting that the data provided by developers represents a worst case scenario at the point the plan has been finalised and is likely to be reduced further going forward (24/01/2024)	We maintain the position that the Hornsea 4 approach is our preferred option and that both the Hornsea 3 and Hornsea 4 method and results (i.e no. of pairs delivered) should be presented in the plan. This will allow the SoS to make an informed decision having weighed the arguments from the examination. Providing the number of structures and a range of pairs delivered provides the necessary detail to all parties about what will ultimately be delivered. We are thereofre content with the presentation of the data provided by RWE and ODOW in Table 7, noting that the data provided by developers represents a worst case scenario at the point the plan has been finalised and is likely to be reduced further going forward (24/01/24)	Agreed (BL) 12/01/2024	The Crown Estate note the developers views that the Hornsea 4 method is their preferred approach, however, the wider view of the Steering Group is that the Hornsea 3 method is preferred. The plan documents presents the results f both methods, but clearly indicates that the Hornsea 3 method is recommeded. This is in line with the decision making mechanism in the agreed Terms of Reference.
8	ANS	Offshore structures are preferred	Feedback from SG review of report	JNCC advises against the inclusion of onshore ANS in the Plan, and could not agree to this (31/10/23)	This matter is not just a question of 'preference' - NE advises against the inclusion of onshore ANS in the Plan. We support the Plan recommendation that onshore ANS are not progressed. (31/10)	Noting SCNB comments, Defra agrees to not include onshore ANS in the Plan, and identify ANS sites and take stocks on existing structures (08/01)	Noting the SNCB comments, DESNZ thinks it would also be useful to take stock of existing strutures (onshore and offshore) in the overall assessment of where best position (and number) for ANS might be located in future (31/11/23).	Agreed in principle, noting that this is not a commitment and is based on a scenario where all projects proceed. If this was not the case then the requirement for two structures should be reviewed. We also maintain the position that onshore structures are a viable option and offer many practical benefits over offshore structures. We accept that this is not the position of the SG (24/01/2024)	Agreed, noting that onshore structures should not be discounted if a viable option is available within the necessary timeframes (24/04/20240	Noting SNCB views on reasons for offshore structures being preferred over onshore, this agreed (BL) 12/01/2024	The Crown Estate note the views of developers on oshore Artificial Nesting Structures. Offshore Artificial Nesting Structures are preferred in the plan due to the wider views within the Steering Group, in line with the agreed Terms of Reference.
9	OANS	options being considered by the SGSteering Group. In order of preference these are: •The construction of two offshore SANS; •The construction of an additional two tiers (which equates to 2,000 nesting spaces) of nesting structures to Ørsted Hornsea Four offshore kittiwake structure and consideration of one additional standalone offshore SANS; •The construction of an additional two tiers (which equates to 2,000 nesting spaces) of nesting structures to Ørsted Hornsea Four offshore kittiwake structure and consideration of one additional standalone offshore SANS as part of adaptive management; and •The construction of an additional two tiers (which	Feedback from SG review of report	As per line 8, JNCC only supports the provision of two offshore SANS. These could be either two new structures, or one new structure with the remaider of the compensation requirement being provided by the addition of tiers onto another, existing structure (eg the Hornsea 4 ANS). Our advice on this matter has been and remains that the sequencing of allocation of breeding kittiwake (ie how breeding birds a re apportioned between H4 and R4), would need to be established, particulaly during the colonisation stage. (24/01/24)	Of these options NE only supports the provision of two offshore SANS, one of which could be the additional two tiers on the Hornsea 4 structure.	Agree as per NE advice (08/01 - LG)	Agree with first two options as per NE. 19/12/23	The SG appeared to agree that 2 x offshore ANS, one of which could be an extension to a proposed Orsted Hornsea 4 offshore ANS was an acceptable approach. RWE maintains that onshore ANS are still a viable option (24/01/2024).	The SG appeared to agree that 2 x offshore ANS, one of which could be an extension to a proposed Orsted Hornsea 4 offshore ANS was an acceptable approach. ODOW note that onshore structures should not be discounted if a viable option is available within the necessary timeframes (24/01/2024)	Given discussions in the Steering Group to date, it appears the group are in favour of two structures which may include the Orsted tower, as per NE advice. (BL) 12/01/2024	The Crown Estate note the views of developers on oshore Artificial Nesting Structures. Offshore Artificial Nesting Structures are preferred in the plan due to the wider views within the Steering Group, in line with the agreed Terms of Reference.
10	OANS	It was agreed that 2 structures is preferrable to minimise risk	Agreed in the SGM9 call	Agreed. (24/01/24)	Agreed.	Agreed (08/01 LG)	Agreed 19/12/23	Agreed but we maintain our position that onshore towers are a viable option and should be considered by the SG moving forward (24/01/2024)	Agreed in principle, noting that this is not a commitment and is based on a scenario where all projects proceed. If this was not the case then the requirement for two structures should be reviewed. ODOW note that onshore structures should not be discounted if a viable option is available within the necessary timeframes (24/01/2024)	Agreed (BL) 12/01/2024	The Crown Estate note the views of developers on oshore Artificial Nesting Structures. Offshore Artificial Nesting Structures are preferred in the plan due to the wider views within the Steering Group, in line with the agreed Terms of Reference.
11	ANS seasons	The group agreed that there could be a reduction from the 'standard' 4 breeding seasons (with regard to delivery before impact). However, it would need to be evidenced that the potential mortality debt could still be paid off during the lifetime of the compensation and agreed with the SG first.		JNCC don't agree that the wording accurately reflects our advice or that there was agreement in the SG. Our advice was that a second structure could follow on a year later, but that our expectation was that one would be in place for 4 breeding seasons, and that delaying the second potentially increases the mortality debt build up and hence the potential total scale of compensation requirement. (25/01/24)	NE do not believe that this agreement was made in the SG and we consider that 10.1.4 of the updated plan does not reflect SNCB advice. NE's advice was that provided one of the two structures was installed 4 breeding seasons in advance, we would be open to the idea of a 2nd structure being installed only 3 breeding seasons in advance. In other words, there is the potential for flexibility around the installation of a 2nd offshore ANS but not both (25/01/24)	Content with this approach, subject to agreement with SNCBs and evidence supports reduction (LG 25/01/2024)	Content with this approach provided evidence supports reduction. (25/01/2024)	RWE support this approach as it gives greater chance of meeting UK targets for deployment of offshore wind and reduces the 'at risk' costs to developers (24/01/2024)	ODOW support this approach as it gives greater chance of meeting UK targets for deployment of offshore wind and reduces the 'at risk' costs to developers (24/01/2024)	The Crown Estate interpret the discussions within the Steering Group sessions that a reduction in breeding seasons would only apply to one of any two structures, and not both. This was the advice of the SNCB's into the Steering Group (BL) 24/01/2023	The Crown Estate consider the views of Natural England and JNCC to represent the discussions in the Steering Group, and the agreement of members in those discussion. This was that a reduction in breeding seasons from construction of the ANS to operation of the OWF would only apply to one of any two structures constructed.
12	Examination	Examiners Questions related to this KSCP during the DCO process following the submission of the KSCP should be directed to the relevant project applicant who will then convene the Steering Group to provide a response, ensuring that the view of the Steering Group is presented in line with the principles of the Steering Groups agreed Terms of Reference. It is requested that due to the requirement of input of the Steering Group the Examiners put forward Written Questions where practicable.		JNCC has a delegation arrangement in place with NE to provide statutory advice during th examination period. However, we don't agree with the wording as this would compromise the ability of SNCBs to provide statutory nature conservation advice as per our remit. (25/01/24)	As we will be providing statutory nature conservation advice on the KSCP into the Examinations, NE does not consider it appropriate for us to also be involved in formulating responses to any input requests. The Plan would be clearer if 10.2.3 reflected this. We hope to continue to provide Steering Group advice on other matters during the DCO processes subject to availability. (25/01/24)	We are content that examiners questions are directed at the relevant project applicant and not the points others have made. The ability to provide statutory advice shouldn't be compromised. We would be open to a discussion on the role of the steering group if this would be useful. (LG 25/01/24)	Appropriate that the initial contact on individual DCO applications is via applicant project with TCE and Steering Group being alerted/convened by them. (25/01/2024)	RWE maintain the position that TCE should be the initial point of contact to 1) highlight that this is not a project level plan and 2) ensure consistency of approach (24/01/2024)	ODOW maintain the position that TCE should be the initial point of contact to 1) highlight that this is not a project level plan and 2) ensure consistency of approach (24/01/2024)	Agreed (BL) 24/01/2024	The Strategic Compensation Plan has been developed in line with the principles agreed by members in the Terms of Reference. As it will act as a DCO application document for the developers there is potential that the Examiners may want to ask for clarity or detail around it's content. As such it is appropriate for the Steering Group to determine how to respond on these questions, rather than any one individual member. The agreed Terms of Reference provide that the Steering Groups will continue to exist until all obligations have been discharged, including post consent requirements, as such it is agreed that the Steering Group still be formed during Examination. It is acknowledged that some members of the Steering Group may wish to abstain from inputting during that period.

Offshore Wind Leasing Round 4

Appendix D - Round 4 Strategic Compensation – Artificial Nesting Structure Site Selection

The Crown Estate

Date: 19th December 2023

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Rev.no.	Date	Description	Prepared by	Verified by	Approved by
1	1/9/23	First draft	EMOR	FRCA	SPAC
1.1	27/09/23	Revised following TCE & TL comments	EMOR/FRCA	FRCA	SPAC
1.2	06/11/23	Revised following Steering Group and EWG Comments	EMOR/FRCA	FRCA	SPAC
1.3	17/11/23	Revised following TCE & TL comments	EMOR	FRCA	SPAC
1.4	19/12/23	Revised following TCE & TL comments	EMOR	FRCA	SPAC

Contents

1 Introduction

1.1.1 During the fourth meeting of the Offshore Wind Leasing Round 4 Plan (**"**Round 4**"**) strategic steering group for kittiwake compensation (the "Steering Group") on 25th April 2023, the attendees discussed the approach to selecting sites for artificial nesting structures ("ANS") as a strategic compensation measure for kittiwake. NIRAS (as technical advisors to The Crown Estate) presented site selection criteria, which covered both onshore and offshore locations (as described below). The criteria were developed to enable potential locations for an ANS to be ranked and were categorised as either 'critical' or 'aimed at optimising the success of the measure'. Criteria were refined from those used in previous offshore wind project ANSs, which were made publicly available as compensation measures. As a result, these criteria have undergone a detailed consultation process and were reviewed by Natural England and other stakeholders. This process ensures a strong foundation for determining suitable potential locations for kittiwake ANS.

1.1.2 The Steering Group reached a consensus that the criteria were appropriate and agreed to apply them to potential locations as part of the strategic measure planning. This document outlines the site selection process undertaken by NIRAS (on behalf of The Crown Estate) to determine ecologically beneficial locations to construct an ANS for breeding kittiwake in the North Sea.

2 Site Selection Process

2.1.1 The site selection process for an ANS has been undertaken via a Geographical Information System exercise where ecological criteria is a primary consideration. The location of an ANS in terms of proximity to productive foraging areas and avoiding competition with other existing seabird colonies while maintaining connectivity with existing breeding kittiwake colonies are the key factors to increase the chance of colonisation of a structure.

2.1.2 Considerable site selection work has been undertaken and presented in an offshore and onshore context by recent offshore wind farm compensation cases. Those of particular relevance are from Hornsea Four (Orsted, 2022) and Outer Dowsing (2023). The site selection methodology presented here builds on this work, using similar approaches.

2.1.3 To maximise the chances of success, an ANS must have the basic building blocks required for the formation of a new colony, these are a safe nesting environment within foraging range of a stable prey source. One of the most important factors in choosing an optimal location for an ANS is the availability of prey resources. Colonies are generally located where travel distances between breeding and foraging locations are reduced, enabling optimal foraging for central-place foragers (Sandvik *et. al.* 2016). However, the size and distribution of colonies also has the potential to influence prey availability, and can create areas where new colony formation is unlikely. Density dependent factors are important in driving colony foraging patterns of kittiwake (Wakefield *et. al.* 2017), and segregation between colony foraging areas is apparent at some colonies (Bolton *et. al.* 2020). Therefore, the size and proximity of neighbouring colonies is important in determining the intensity of potential intraspecific inter-colony competition and segregation in foraging areas (Bolton *et. al.* 2020). Social attraction and stimulation is also important for kittiwake. Prospecting birds are strongly attracted to sites where social cues indicate breeding conditions are optimal (i.e. areas where productivity is high). In terms of connectivity to existing colonies, kittiwake are not highly philopatric with only 11% returning to their natal colony to breed (Horswill and Robinson 2015). The majority (c. 89%) of first

time breeders generally recruit to other colonies within 100 km of their natal colony, with the rest recruiting ether between 400-1000 km from the natal colony (Coulson 2011).

2.1.4 These considerations have formed the key foundations for building a strong approach to determining suitable ANS locations.

3 Selection Criteria

3.1.1 A limited number of Special Protection Areas ("SPAs") are present in English waters for kittiwake and as a consequence, on the east coast, almost all impacts from offshore wind farms ("OWFs") are apportioned back to the Flamborough and Filey Coast SPA. To maintain connectivity with this population, site selection is only considered for sites in English, North Sea waters. Offshore and coastal locations within 100 miles of the coast were considered with the primary focus on the following ecological factors. It is envisioned that this will be a multi-faceted process with technical factors considered (see next steps) once sites of high ecological suitability have been identified.

3.2 Proximity to foraging areas

3.2.1 One of the most important factors in choosing an optimal location for an ANS is the availability of prey resources. There are however considerable knowledge gaps surrounding the location, size and availability to kittiwake of their key prey resources, especially further into the offshore environment. Diet and habitat preference studies indicate there is variation in the importance of these factors across their range (Wilson *et. al.* 2021, Chivers *et. al.* 2012). The quantity of prey resources available to foraging breeding adult birds (i.e. numbers of breeding adults and chicks the resource can energetically support) is associated with a degree of uncertainty, but certain proxies have been agreed by the Steering Group on as the most likely indicators of favourable food resources – two of these proxies have been used in this exercise: the presence of tidal mixing fronts and forage fish distribution.

Within foraging range of physical descriptors of prey abundance and availability e.g. tidal fronts

3.2.2 A key environmental feature that has been identified as providing important foraging opportunities for kittiwake are fronts (Camphuysen *et. al.* 2005). In the UK and Dutch waters, the Flamborough Front appears to be a particular area of importance for kittiwake (Riddell and Davison-Smith, (2023)). Kittiwakes can only reach prey within the top metre of the water column, so they are often associated with hydrographic features such as shelf breaks and tidal fronts which concentrate prey near the water surface (Leopold, 1993; Skov and Durinck, 1998; Markones, 2007). Stratification of the water column and tidal currents running over uneven topography is thought to be important in creating surface aggregations of sandeels that kittiwakes can exploit (Embling *et. al.,* 2012). Though tidal fronts can vary significantly depending on oceanographic, meteorological and climatic drivers, identification of persistent fronts may provide a useful indication of prey availability.

3.2.3 Miller & Christodoulou (2014) produced maps identifying frontal locations which have been widely used in the recommendation of UK Marine Protected Areas, as a proxy for identifying regions with high pelagic diversity. These maps were used in the heat map production process to identify potential areas of high prey availability and appropriate foraging conditions for kittiwake.

Within foraging range of biological descriptors of prey abundance and availability e.g. sandeel habitat, or other proxies indicating high likelihood of prey availability

3.2.4 During the breeding season, kittiwake feed mainly on small pelagic shoaling fish; in UK waters these consist of energy-rich species such as sandeels, sprats and young herring. Sandeel are a key prey species for the seabirds in the North Sea and their abundance and size are strongly linked to breeding success in kittiwake (Lewis et. al. 2001). There is a degree of regional variability in kittiwake prey preferences (Chivers et. al. 2012, Bull et. al. 2004, Furness and Tasker 2000), therefore this criteria does not represent an absolute measure of likely prey availability.

3.2.5 Marine Scotland (Langton *et. al.* 2021) have recently produced verified distribution models for the lesser sandeel (*Ammodytes marinus*), with maps predicting the occurrence and likely density of sandeels in parts of the North Sea. The probability of presence of buried sandeel in the North Sea study region was used in the heatmap process to identify potential prey resources for kittiwake.

3.3 Proximity to existing kittiwake colonies

3.3.1 For colonial seabirds, proximity of conspecific individuals is a strong stimuli influencing nest site selection (Buxton et. al. 2020). The presence of other nesting birds breeding successfully provides information about local breeding conditions (e.g., abundant food, safe places to nest) (Forbes and Kaiser 1994, Kildaw *et. al.* 2005). Consequently, the presence of a colony may reliably indicate favourable conditions. Birds are likely to recruit to other colonies within 100 km of their natal colony therefore proximity to existing kittiwake breeding sites will be a key factor in ensuring colonisation for an ANS. Connectivity between colonies is important, however, the presence of a large number of birds may increase competition for food resources nearby. Exceptionally large colonies only occur where there is little or no suitable nesting habitat elsewhere within the foraging range of birds from that colony (Furness and Birkhead 1984). This implies that provision of ANS would be more likely to attract kittiwakes where competition for resources would be less than at large colonies (e.g. avoiding areas within foraging range of large colonies). Therefore this criteria was based on the proximity to existing 'small' colonies (<5,000 pairs), with higher value given to sites closer (likely to be within visual range) to existing colonies with decreasing value based on dispersal distances detailed in Coulson (2011).

3.3.2 NB. There are populations of kittiwake known to be breeding on North Sea oil and gas rigs within the search area (Orsted, 2022), however, the location of these rigs and population sizes of kittiwakes are not in the public domain so have not been included in this exercise. This information (or similar collected by other developers) could alter the scoring of some areas offshore to become more favourable for locating an ANS.

3.4 Avoidance of areas where intraspecific competition is likely to be high.

3.4.1 The size and distribution of colonies has the potential to influence prey availability, so can create areas where new colony formation is unlikely. Density dependent factors are important in driving colony foraging patterns of kittiwake (Wakefield *et. al.* 2017), and segregation between colony foraging areas is apparent at some sites (Bolton *et. al.* 2020). Therefore, the size and proximity of neighbouring colonies is important in determining the intensity of potential intraspecific inter-colony competition and segregation in foraging areas (Bolton *et. al.* 2020), especially in relation to the installation of a new colony. The size and stability of prey resources will be key to whether neighbouring colonies are able to share or segregate resources at sea. For example, Paredes *et. al.* (2014) found that foraging areas of adjacent kittiwake colonies were highly segregated close to the colonies, but shared foraging grounds existed at more remote oceanic locations. Density-dependent competition may drive

segregation locally, but temporally stable areas of high productivity located further away may be able to support a greater number of birds, causing segregation to break down (Bolton *et. al.* 2020).

3.4.2 Predictive modelling informed by seabird tracking data has been used to map the key at sea hotspots (which are likely to be foraging areas) for kittiwakes in UK waters (Cleasby *et. al.* 2020; Wakefield *et. al.* 2017). These maps have been used to highlight areas where competition for food resources is likely to be most intensive with the heatmap criteria set up to avoid overlap of ANS foraging areas with the key foraging areas of existing North Sea colonies.

3.5 Likelihood of exchange with FFC population but avoiding direct competition for resources

3.5.1 Statutory stakeholders have previously agreed that ANS site selection should avoid the core foraging range distance from the Flamborough and Filey Coast ("FFC") SPA (55 km for kittiwakes (based on Woodward *et. al.* 2019)), whilst maintaining some connectivity with FFC SPA to allow colony interchange to be a possibility. Therefore, a criteria scoring highly for connectivity with FFC SPA population (i.e. Within 100 km (Coulson 2011)) but not overlapping with the mean (core) foraging ranges from the SPA was included.

3.6 Hard Constraints

3.6.1 There are constraints from existing infrastructure, including oil and gas platforms, cables and pipelines, aggregates, OWFs, protected monuments and protected wrecks where the seabed is already occupied and therefore cannot be built in this location. In addition, there are areas such as navigational channels, military areas and also some specific types of land use where it is not possible to build structures. These are deemed as hard constraints and are removed from the study area.

3.6.2 Based on previous site selection discussions for other projects & spatial planning the following data and buffers have been used:

- Off wind farm (OWF) +15km buffer (based on an arbitrary value)
- OWF-met equipment
- Wave & tidal +500m
- Cables & pipelines +500m buffer
- Aggregate extraction areas +500m buffer
- Wrecks +500m buffer
- Wreck exclusion zones
- Scheduled monuments
- World Heritage Site
- IMO major shipping channels +1km
- Oil & Gas structures+500m
- Carbon capture Storage +500m
- Evaporates licence areas +500 (none were found in the area)
- Offshore mining +500m
- Land use types which would most likely preclude ANS construction, specifically residential, military, cemetery, quarry and retail.

3.6.3 In addition, The Crown Estate hold commercially sensitive information which has been considered in the identification and refinement of the Area's of Search.

3.6.4 The following datasets were not freely and publicly available:

- Defence areas
- Anchorage areas
- Aquaculture licences

3.7 Designated sites

3.7.1 Marine Conservation Zones ("MCZs"), Special Areas of Conservation ("SACs") and SPAs are highlighted in the final heatmaps but could still be considered if good ANS locations exist within them, but where an ANS would not cause an adverse effect on designated or classified features.

4 Map creation

4.1.1 A map was created for each criteria described in Section 3 above, the spatial extent of the search area within each map was scored based on the classification bands outlined in Table 4.1, with certain criteria weighted more highly if deemed to be critical to success (opposed to those which would optimise success). Ecological considerations included in the process are presented within Figure 4.2 to Figure 4.4. Scores were weighted by importance with critical criteria scoring double that of optimising criteria. All maps were overlaid and scores were calculated (summed) for each 10 km^2 cells to give the final heatmap surface. Hard constraints were then overlaid and are presented on the final map (**Error! Reference source not found.**). The map is also presented as an interactive web map and can be accessed via https://experience.arcgis.com/experience/a39d5aff7316419cba9098b5b3156221.

4.1.2 The size of the identified Areas of Search ("AOS") are considered large enough to provide the flexibility required for ground conditions to ensure the structures can be suitably micro-sited and acquire the necessary site permits and licences.

Table 4.1 Details on site selection scoring criteria – Scores were weighted by importance with critical criteria scoring double that of optimising criteria. Foraging ranges used are based on Woodward et. al. 2019, colony interchange distances are based on information in Coulson 2011.

Criteria	Weighting	Score			
		++	+	-	--
Prey availability – proximity to fronts	Critical	Area is within mean foraging range (55 km) of a tidal front	Area is beyond mean foraging range but within mean-max foraging range (156 km) of a tidal front	Area is beyond mean-max foraging range (156 km) of a tidal front	No tidal fronts exist within max recorded foraging range (770 km) for the species.
Prey availability – proximity to sandeels	Critical	Area lies on an area with sandeel presence	Area is beyond mean foraging range but with-in mean-max foraging range (156 km) of sandeel areas	Area is beyond mean-max foraging range (156 km) of sandeel areas	No foraging areas likely to exist within max foraging range (770 km) of the site
Connectivity - Distance to existing colonies	Critical	Area is 0-5 km from a small (<5000 pairs) existing colony (close enough to be in visual range for social cues)	Areas between 5-100 km from an existing small colony (areas of high connectivity where interchange of birds is most likely based on distances stated in Coulson 2011[1])	Area between 100-900 km from any known breeding colonies (lower chance of colony interchange[1])	Areas beyond >900 km from any known breeding colonies (beyond the distance colony interchange is likely to occur[1])
Connectivity to FFC SPA but avoiding direct competition	Optimal	Areas within 100 km[1] of FFC SPA but beyond likely foraging overlap zone i.e. beyond mean foraging range but out with likely foraging	N/A	Area beyond 100 km of FFC SPA [1]	Areas within likely foraging overlap zone of FFC SPA i.e. within mean foraging range (55 km)

[1] Coulson (2011) examined ringing recoveries of kittiwake born in the UK and states "Peak of recoveries of kittiwake were within 100 km of their place of birth, and a second, smaller peak occurred between 400 and 900 km from the natal colony. With the only exception being two birds which were found beyond 1500 km (moving from the UK to Greenland)".

		overlap zone (between 55-100 km from FFC)			
Minimising competition for resources with existing colonies	Optimal	Areas beyond and within max curvature kernels from Cleasby *et. al.* 2020 Gettis Ord hotspots – Limited competition for resources	Areas between statistically significant areas and max curvature kernels from Cleasby *et. al.* 2020 Gettis Ord hotspots – some competition for resources	Areas within the 5% Gettis Ord bands Cleasby *et. al.* 2020 Gettis Ord hotspots – high competition for resources likely	Areas within the 1% Gettis Ord band Cleasby *et. al.* 2020 Gettis Ord hotspots - highest competition for resources likely

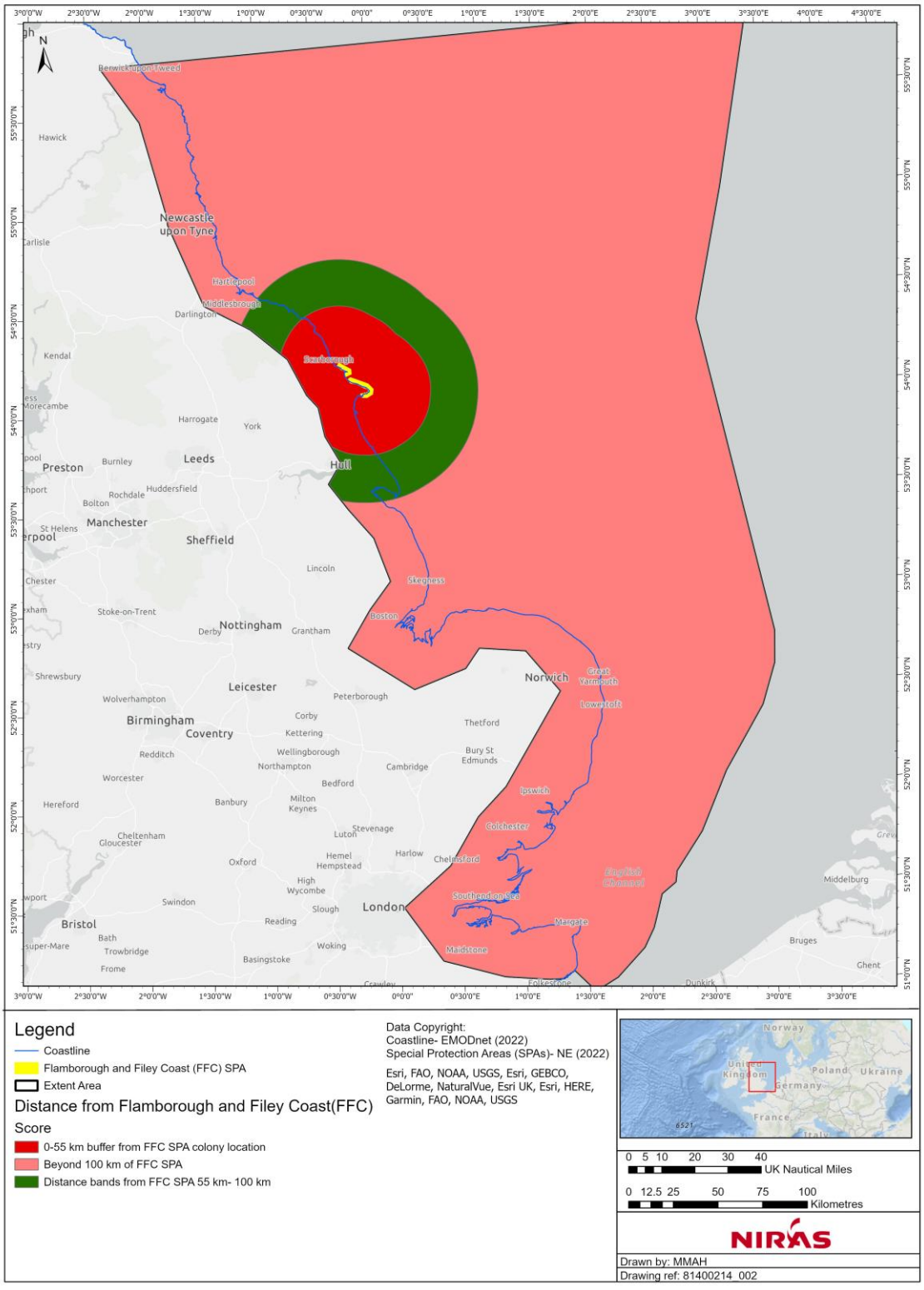

Figure 4.1: SPA connectivity and composition criteria map

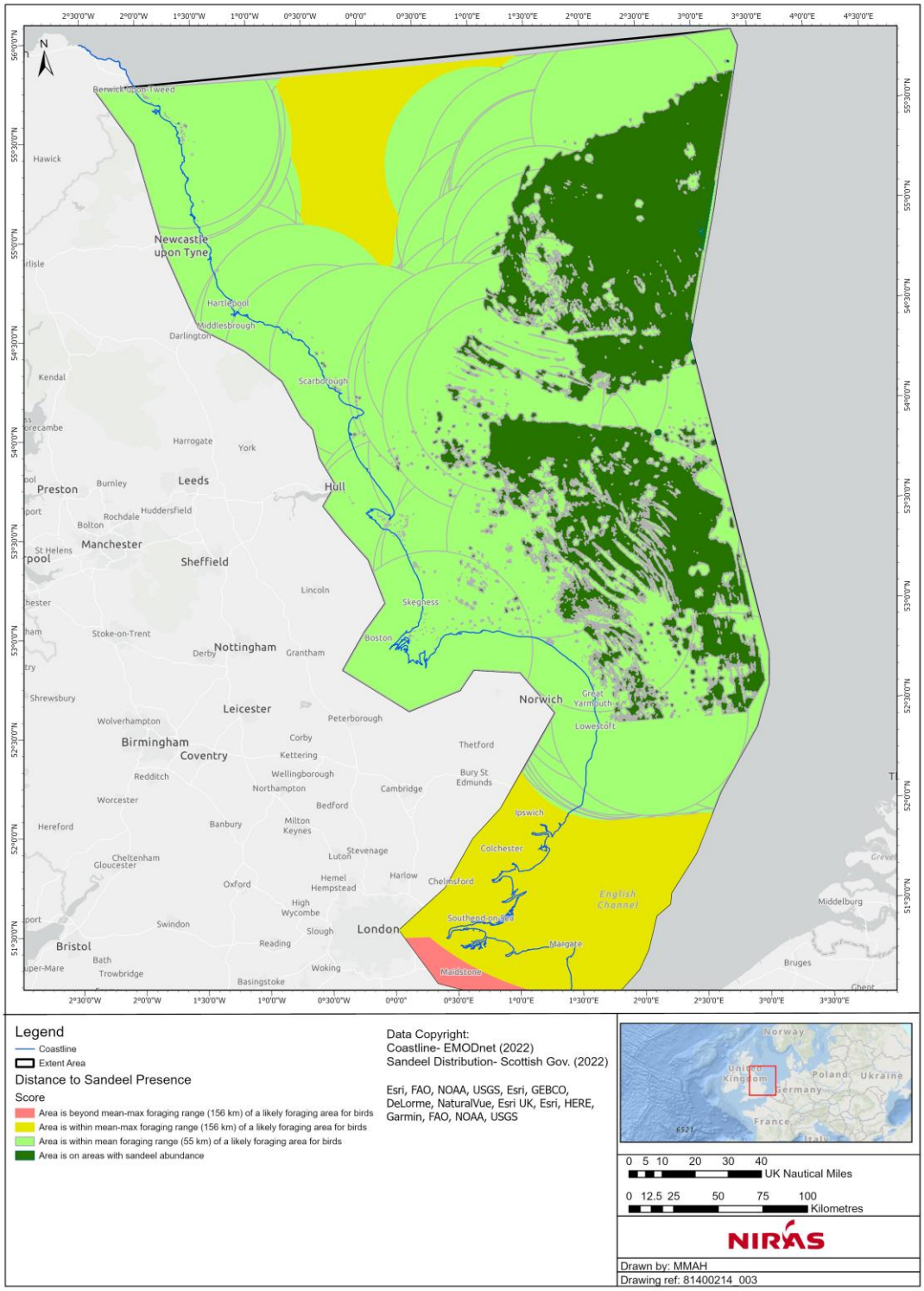

Figure 4.2: Sandeel availability criteria map

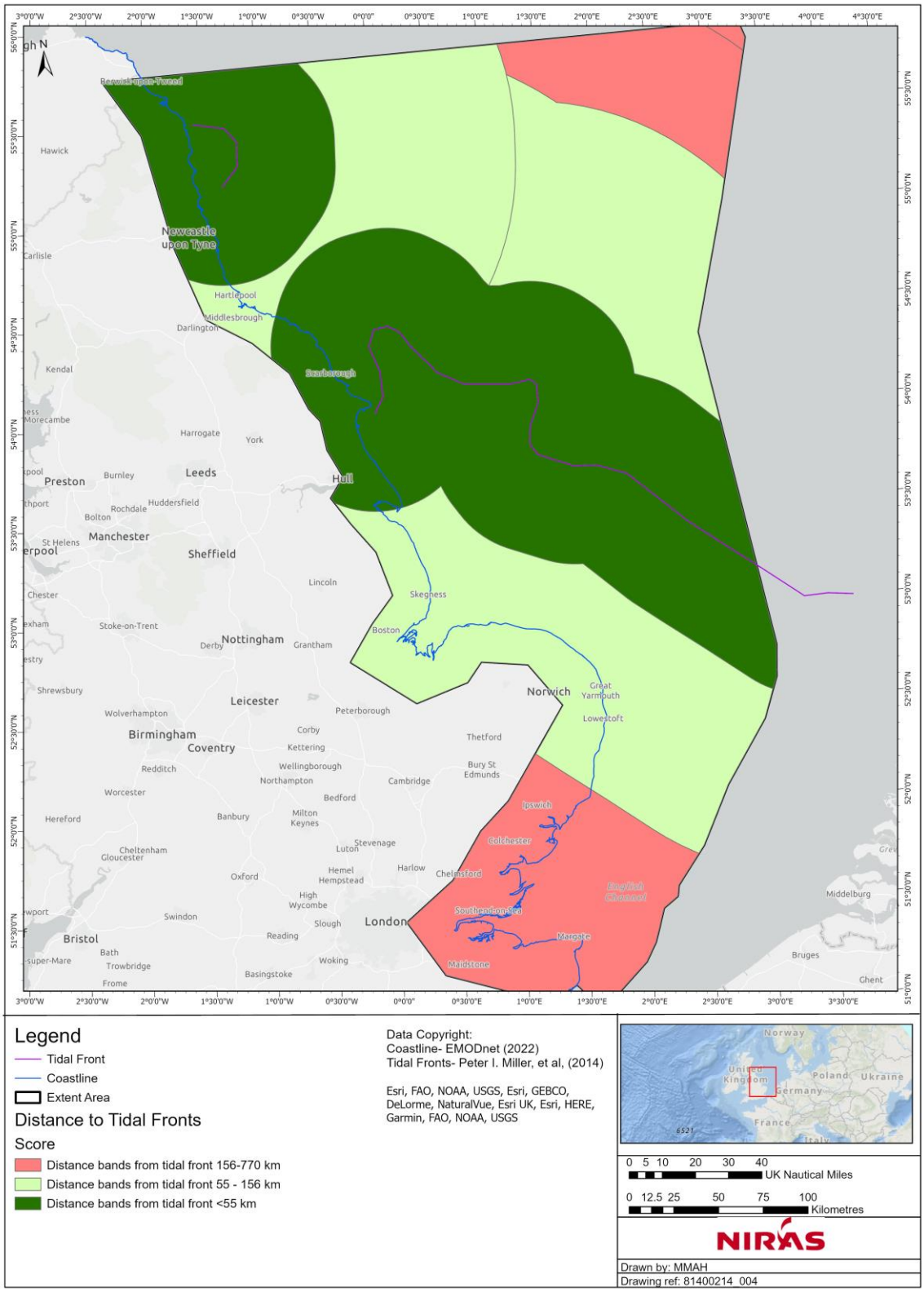

Figure 4.3: Prey availability criteria map

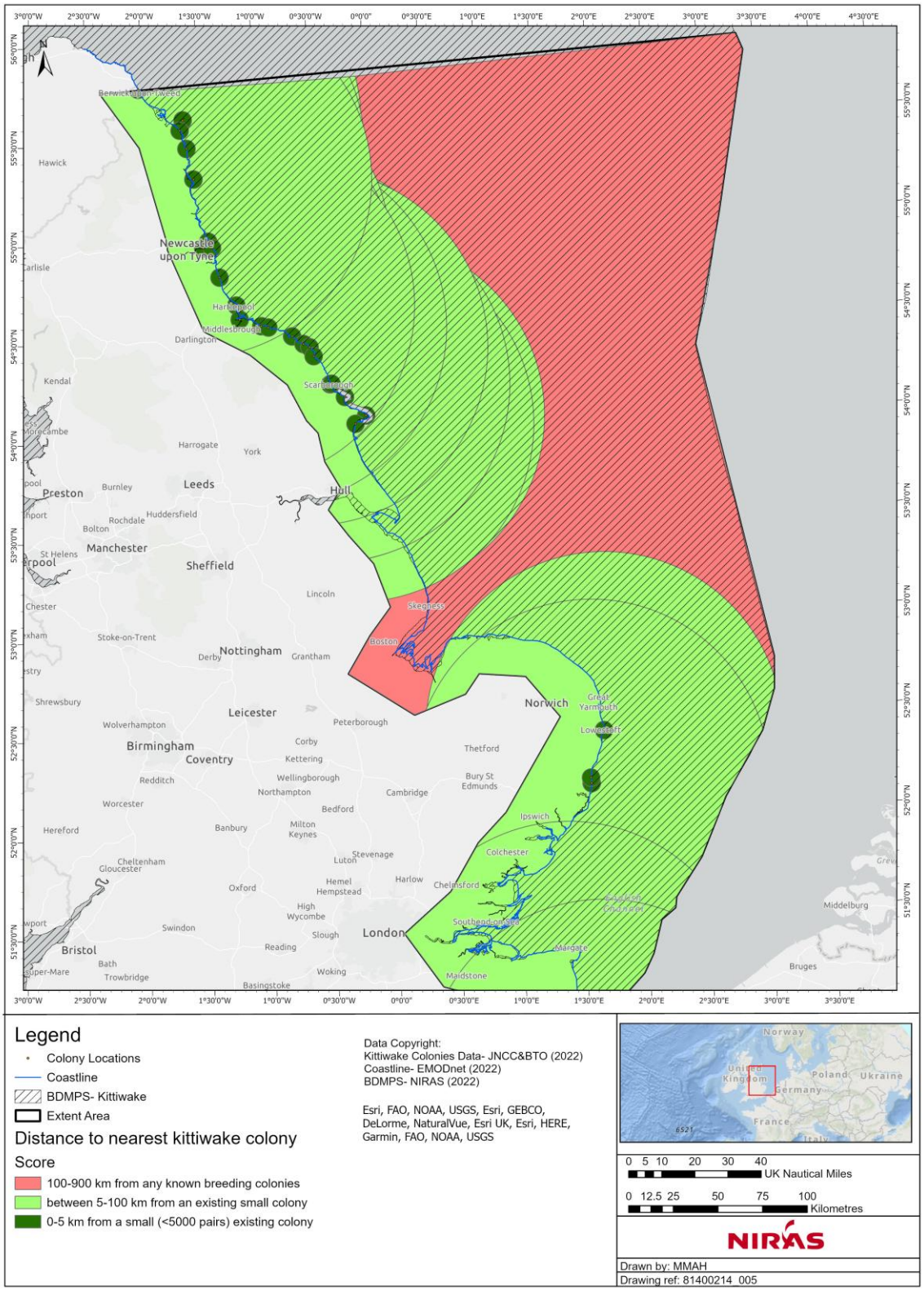

Figure 4.8: Connectivity and competition criteria map based on colony locations

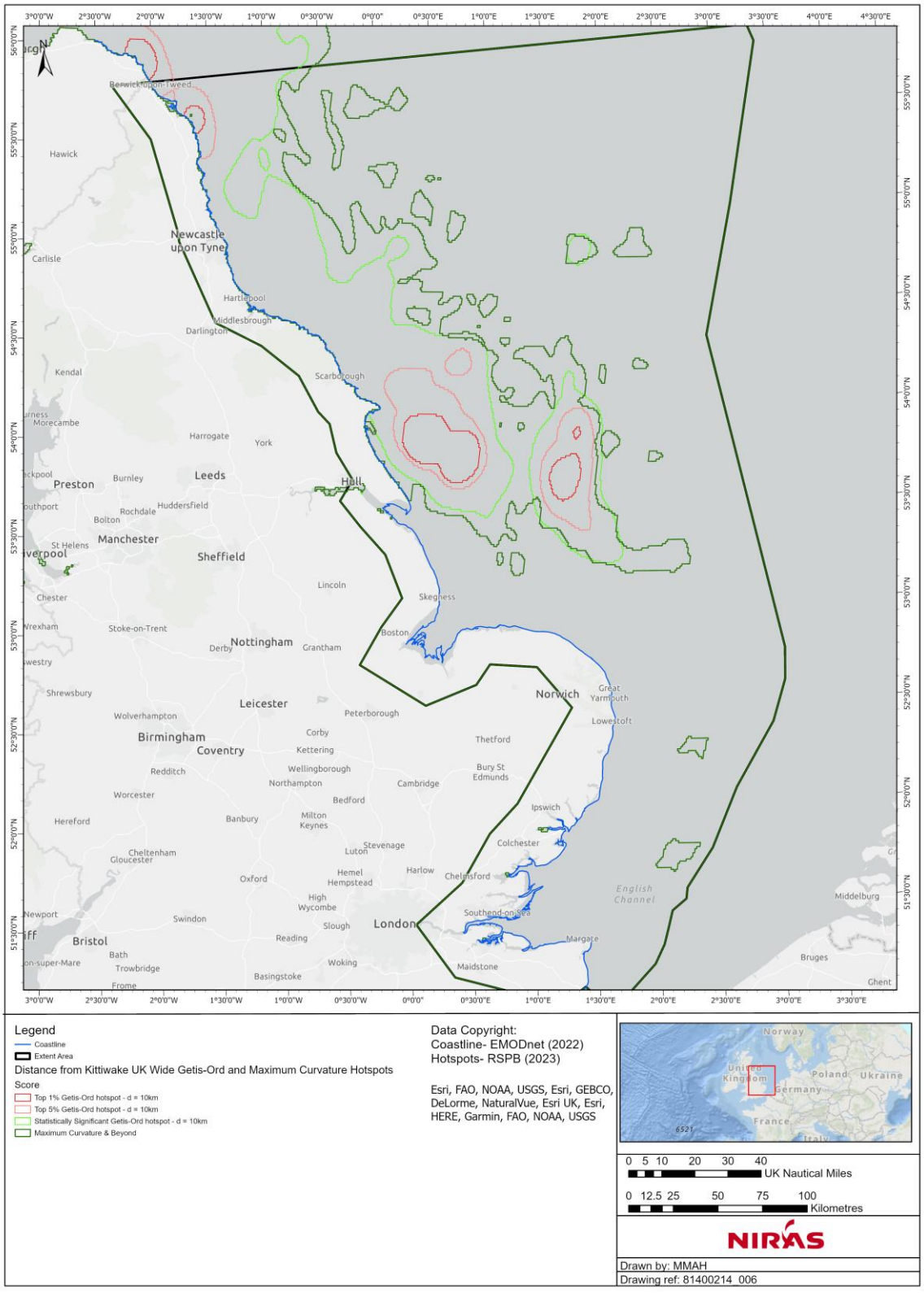

Figure 4.4: Connectivity and competition criteria map based on hotspots

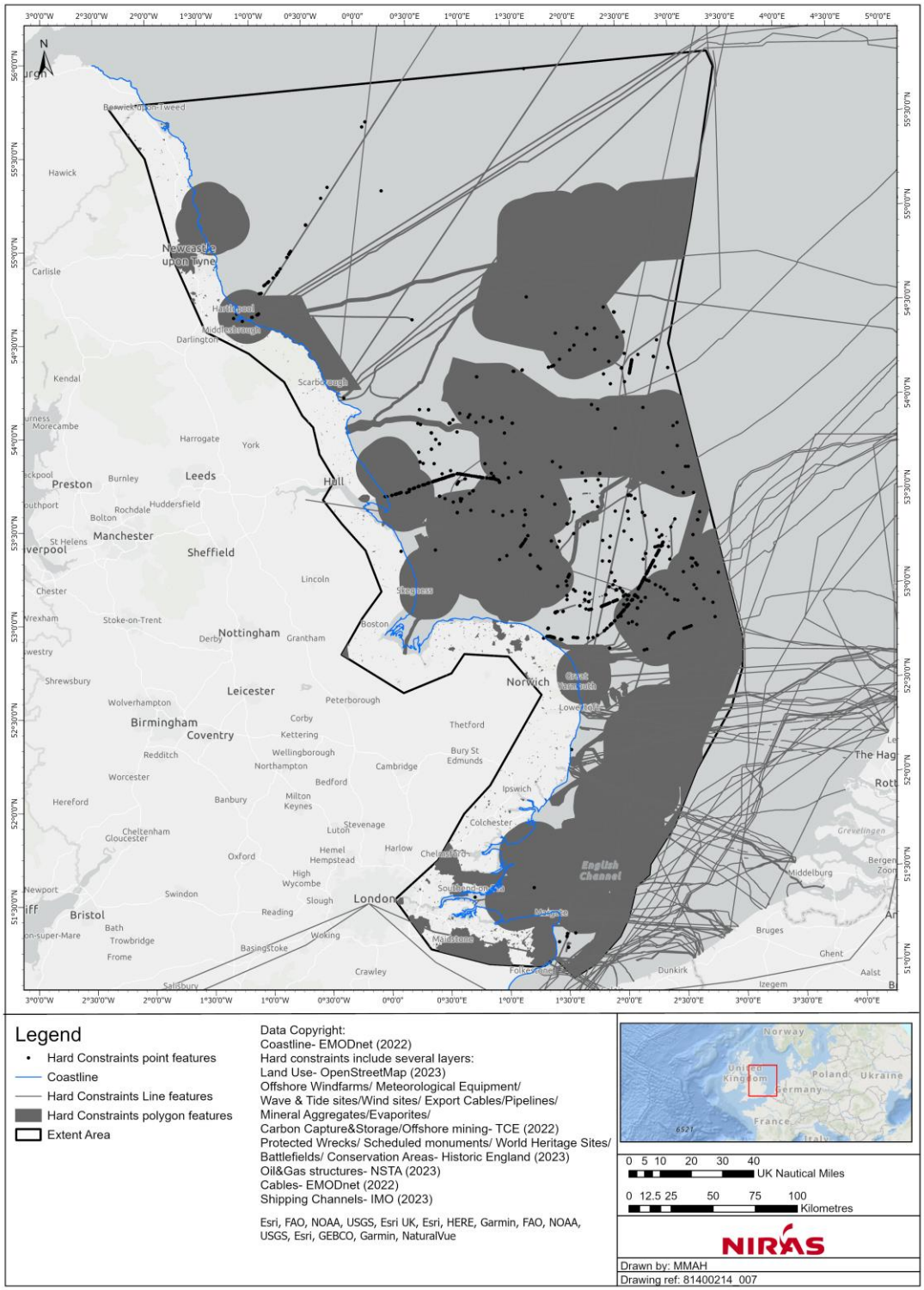

Figure 4.5. Hard Constraints

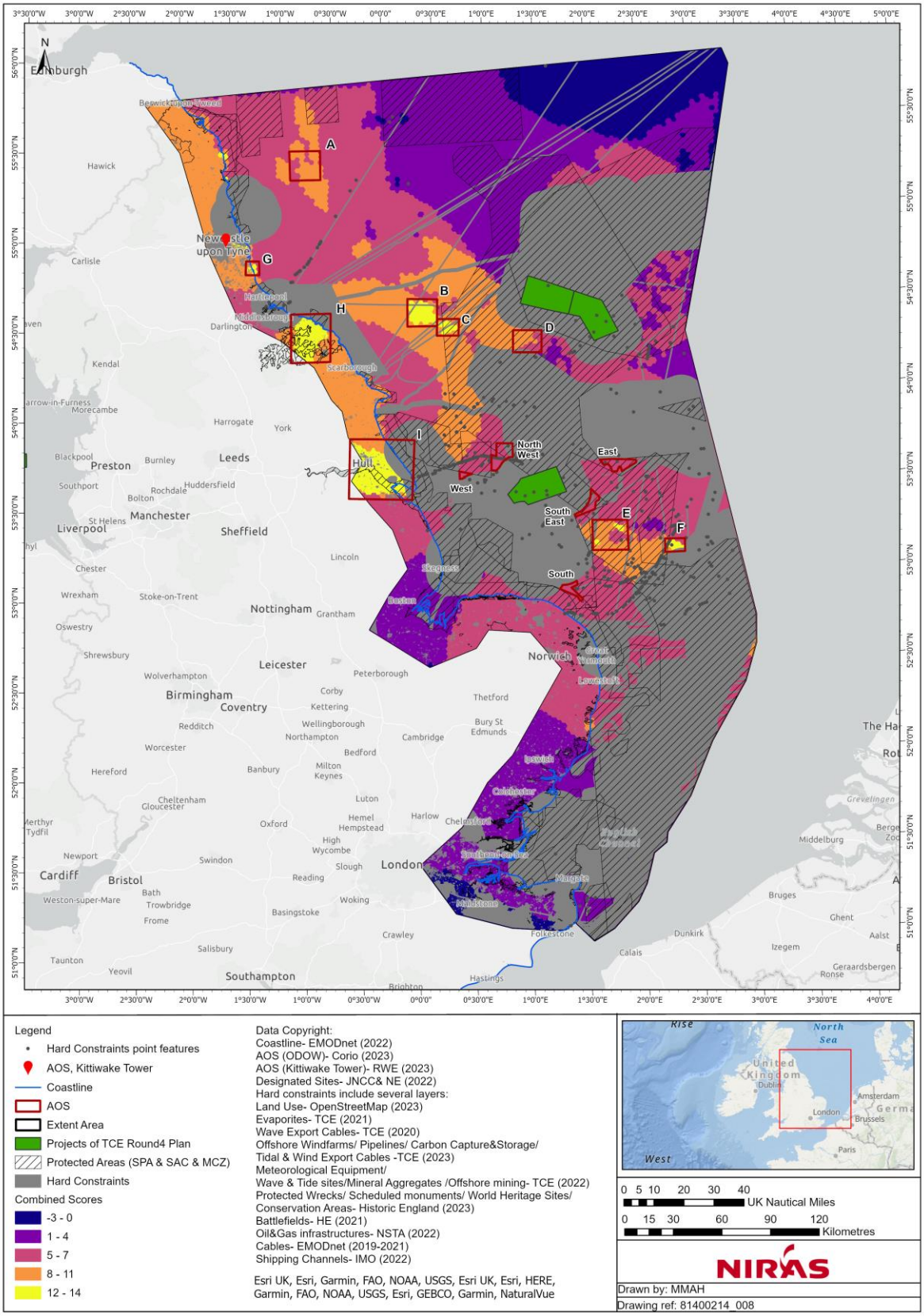

Figure 4.6. Final map of combined scores

5 Results

5.1.1 Following the application of the scoring criteria and hard constraints to the ecologically favourable areas, nine preferred areas were identified **Error! Reference source not found.**Figure 5.6). These nine areas, were then scored based on the existing comparative scoring criteria (presented in Steering Group meetings). There are no specific determinators between the way each site has been labelled (A-I). Economical and construction constraints should be considered at a later stage for these sites. This process should not rule out the further consideration of remaining areas as new information may become available in the future, which may make other areas suitable for an ANS delivered collaboratively or strategically with other parties.

Table 5.1 Scoring table with scores for each area based on agreed criteria

AOS	Overall score	Reasoning
A	20	Scores highly on proximity to potential food resources fronts, proximity to existing colonies may be closer than scored (due to presence of offshore colonies) but slightly further from sandeel abundance than other sites and outside area of likely interchange with FFC SPA.
B	27	Scores highly on proximity to potential food resources, may be closer than scored (due to presence of offshore colonies, however, these locations are not available in the public domain so could not be included in spatial analyses) but may be too close to existing colonies which could increase competition for food resources.
C	23	Scores highly on proximity to potential food resources, may be closer than scored (due to presence of offshore colonies, however, these locations are not available in the public domain so could not be included in spatial analyses) but may be too close to existing colonies which could increase competition for food resources.
D	25	Scores highly on proximity to potential food resources, may be closer than scored (due to presence of offshore colonies, however, these locations are not available in the public domain so could not be included in spatial analyses) but potentially close to offshore wind developments.
E	23	Scores highly on proximity to potential food resources, may be closer than scored (due to presence of offshore colonies, however, these locations are not available in the public domain so could not be included in spatial analyses) but outside area of likely interchange with FFC SPA and potentially close to offshore wind developments.
F	24	Scores highly on proximity to potential food resources, may be closer than scored (due to presence of offshore colonies, however, these locations are not available in the public domain so could not be included in spatial analyses) but outside area of likely interchange with FFC SPA and potentially close to offshore wind developments.
G	16	Good proximity to potential foraging areas but scored down on criteria/issues associated with being onshore e.g. coastal erosion and higher levels of human disturbance/conflict.

H	19	Good proximity to potential foraging areas but scored down on criteria/issues associated with being onshore e.g. coastal erosion and higher levels of human disturbance/conflict. Site close to areas where competition for prey is likely to be high.
I	1	Good proximity to potential foraging areas but scored down on criteria/issues associated with being onshore e.g. coastal erosion and higher levels of human disturbance/conflict Close to areas where competition for prey is likely to be high and further than the 100 km distance advised for connectivity with existing land-based colonies.

5.1.2 Apart from AOS 'I', all sites scored positively on the critical criteria. This uses only publicly available colony locations from the seabird monitoring program database, therefore there is the potential that all AOS may also be closer to existing colonies than the scores can reflect, e.g. there are kittiwake colonies on offshore structures which will likely mean there is more connectivity with existing colonies. All sites other than AOS 'I' score highly for ecological suitability so should be considered further. AOS 'I' has been excluded from further consideration.

6 Next steps

6.1.1 Now a 'long list' of areas of search have been identified via the NIRAS and developer-led approaches, the long list can be refined based on a number further criteria. As noted within the initial sections of this report, the site selection approach has been determined by ecological aspects. A potential barrier to the implementation of an ANS in an AOS may be as a result of hard constraints, such as shipping lanes etc.

6.1.2 Following discussion surrounding the suitability of onshore or offshore artificial nesting structures, the Steering Group decided to pursue offshore artificial nesting structures as a preference as a result of Steering Group discussions and the ecological evidence presented within the KSCP, and lack of certainty in the development of further onshore artificial nesting structures.

6.1.3 The next stage in the site selection process will be to apply additional shortlisting criteria as follows:

Additional soft constraints to be considered:

- SAC
- SPA
- MCZ
- Sites of Special Scientitific Interest ("SSSI")
- Ramsar sites
- Proximity to Areas of Outstanding Natural Beauty
- Disposal sites
- Shellfisheries classification areas
- Bathing waters
- Awarded Oil & Gas licence blocks
- Hydrocarbons fields
- Proximity Ports/ HA areas

- Shipping activity
- Tourism/ leisure activities
- Fishing grounds (in consultation with local fisherman)
- Nature reserves
- Historical conservation areas

To be considered during the refinement to a site within an AOS:
- Unexploded ordnance
- Engineering considerations (e.g. suitable ground/ seabed conditions, depths)
- Lease agreements
- Site access
- Land use plans/ spatial plans
- Flood risk/ coastal erosion (terrestrial locations)

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