

Norfolk Vanguard Offshore Wind Farm In Principle Habitats Regulations Derogation Provision of Evidence

Appendix 2 Alde-Ore Estuary SPA In Principle Compensation



Applicant: Norfolk Vanguard Limited

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1 INTRODUCTION

1.1 Background

1. In response to a request for further information from the Secretary of State (SoS) received by Norfolk Vanguard Limited ('the Applicant') on the 5th July 2021, this document provides updates to the proposed in-principle compensation originally submitted by the Applicant in February 2020 in response to a request for Information from the Secretary of State to the Applicant on 6 December 2019. It is based on a similar document submitted to the Secretary of State in response to a separate request for information for the Norfolk Boreas project (on the 25th June 2021).
2. It should be noted that while this document is specifically related to the Norfolk Vanguard project, the information presented in this document is considered to be appropriate to both the Norfolk Vanguard and Norfolk Boreas projects, since the same compensation is proposed for both and, due to the large degree of over-compensation inherent in the proposed measure, it could readily offset the potential impacts predicted for both projects. Vattenfall, who is separately pursuing consent for the Norfolk Boreas project, has been in discussion with stakeholders about these proposals in relation to both the Norfolk Boreas and Norfolk Vanguard projects, which has led to them being further developed and refined. As a consequence and where appropriate, references are made herein to those discussions conducted as part of the Norfolk Boreas application process.
3. In response to submissions made by Natural England and the Royal Society for the Protection of Birds (RSPB) during the Norfolk Vanguard Examination, the Applicant proposed further mitigation measures above those set out in the Norfolk Vanguard DCO Application in order to give further confidence that there will not be any adverse effects of Norfolk Vanguard Offshore Wind Farm ('the project') on lesser black-backed gull at Alde-Ore Estuary (AOE) Special Protection Area (SPA).
4. This mitigation is detailed in full in the following document which was submitted in response to the SoS's request for further information dated 6th December 2019:
 - Norfolk Vanguard Offshore Wind Farm Additional mitigation Appendix 1 Updated Collision Risk Modelling (ExA; Mit; 11.D10.2.App1, 28 Feb 2020)
5. The additional mitigation resulted in the Norfolk Vanguard collision risk for lesser black-backed gull being reduced by up to 51% compared with those figures presented for the final wind farm design submitted as part of the Application [APP-217]. The annual mortality apportioned to the AOE SPA has been reduced from 4.9 in the original application [APP-217] to 2.6 using Natural England's preferred methods,

while using the Applicant's preferred parameters, this is reduced from 2.8 in the original application to 1.6 individuals. Compensation is therefore discussed in relation to these very small impact magnitudes and the appropriate level of compensation required (if any).

6. The Applicant's firm view remains that there is no Adverse Effect on Integrity (AEoI) for this site as a result of the project alone and in-combination with other plans and projects. This position was supported by the SoS in the Norfolk Vanguard consent decision (1st July 2020) which concluded there would be no AEoI on the AOE SPA.
7. However, the DCO was then quashed in February 2021 and as part of the redetermination the SoS has "decided to revisit the conclusions of the Habitats Regulations Assessment in relation to certain protected sites". Accordingly, in the letter of the 5th July 2021 to the Applicant, the SoS requested further consideration of these matters. Hence this document outlines in-principle compensatory measures that could be developed should the Secretary of State (SoS) conclude AEoI on the qualifying lesser black-backed gull feature of the AOE SPA in relation to the Norfolk Vanguard project. Appendix 1 outlines in-principle compensatory measures that could be developed should the Secretary of State (SoS) conclude AEoI on the kittiwake, guillemot or razorbill features of the FFC SPA.
8. Following the considerable reductions in the predicted impacts from the project as a result of additional mitigation, the Applicant firmly maintains the position presented in the original application [APP-217] and updated in this document, that in respect of these designated sites, an AEoI as a result of the project alone and in-combination with other plans and projects can be ruled out beyond reasonable scientific doubt. However, with due regard to the SoS's request to Norfolk Boreas Limited, and more recent request with respect to the Applicant (see below), this document provides the Applicant's submission in relation to in principle compensatory measures for the qualifying lesser black-backed gull feature of the AOE SPA.
9. The SoS's letter to the Applicant dated 5th July 2021 made the following request for additional information with respect to the Alde-Ore Estuary SPA:

*In line with the request made with regard to the proposed Norfolk Boreas project, in relation to the in-combination impacts on the lesser black-backed gull feature of the Alde-Ore Special Protection Area (SPA), and in addition to the In Principle Compensation Package submitted as part of the application, the **Applicant** is requested to provide the following information in consultation with Natural England:*

- *Details of any strategic compensation options considered; [section 4.7]*

- *Evidence of how any proposed compensation site(s) will be acquired/leased; [section 4.8]*
 - *An implementation timetable for when the compensation measures will be delivered and achieve their objectives in relation to the first operation of the wind farm. [section 4.9]*
10. These specific requests have been addressed within the appropriate sections of this document (as noted), together with other updates to the proposed compensation.

1.2 Purpose of this Document

1.2.1 Context

11. The Applicant does not believe that any compensatory measures will need to be progressed due to the delivery of specific mitigation measures committed to by the Applicant which provide certainty that AEoI on the AOE SPA can be avoided. Therefore, the provision of evidence regarding compensation measures is provided 'in-principle', and is made entirely without prejudice to the Applicant's position that there will be no AEoI on the AOE SPA.
12. This document therefore provides a review of a range of potential measures that could be adopted to compensate for the potential effects on collision risk for lesser black-backed gull at the AOE SPA. This range of compensation measures has been discussed with Natural England, the Department of Environment, Farming and Rural Affairs (Defra) and the Marine Management Organisation (MMO) (as detailed in section 1.2.2 below) and their feedback incorporated where appropriate.
13. In addition, the advantages and inherent compensation renewable energy has the potential to provide for the features of the Natura 2000 network should not be forgotten; with climate change representing the key pressure for a wide range of features. The recent EU funded SEANSE project has assessed the impact of climate change on key bird species (Rijkswaterstaat Zee & Delta, 2020) and concluded that changes in prey availability due to climate change is the current pressure which appears to have the largest impact on lesser black-backed gull at the wider North Sea level. This is likely to be responsible for a substantially greater effect than impacts resulting from any of the other activities (including collision risk). Hence, the benefits would clearly outweigh any very limited harm, although it is recognised that this is extremely challenging to quantify and, therefore, these benefits are the focus of the Imperative Reasons of Overriding Public Interest (IROPI) case (discussed in Habitats Regulations Derogation Provision of Evidence, document reference ExA; IROPI; 11.D10.3 submitted on 28th Feb 2020).

1.2.2 Consultation on in-principle compensatory measures

14. In relation to compensatory measures, draft in principle compensatory measures were provided to Natural England and the MMO on 17 January 2020 in order to seek guidance on the effectiveness of the potential compensatory measures identified; in particular whether they would be sufficient to ensure that the overall coherence of the Natura 2000 network is protected.
15. Written feedback was provided from Natural England on 4 February 2020 and this was then taken into account in the previous version of this document.
16. Vattenfall Wind Power Ltd is the parent company for the Applicant and also the applicant for the Norfolk Boreas project, and the projects are being developed as sister projects. Therefore, the extensive consultation with Natural England and the MMO undertaken during the Norfolk Boreas Examination in relation to possible compensation measures has also informed the updates to this document. Consultation was also undertaken with the RSPB and the National Trust. A record of this consultation is provided in the Norfolk Boreas Appendix 4 Consultation Overview (Norfolk Boreas Examination library reference: REP7- 028).
17. Following the close of the Norfolk Vanguard and Norfolk Boreas Examinations, the Applicant has continued to engage with Natural England on the proposed in-principle compensation measures to ensure that should compensatory measures be required there will be a minimal delay in their implementation, and has also held meetings with Defra and ScottishPower Renewables.
18. Following the request to Norfolk Boreas Limited for further information from the SoS on the 28 April 2021, the Norfolk Boreas applicant undertook further consultation, which is also of relevance to the Norfolk Vanguard project and has informed the updates to this document.
19. A summary of recent consultation with respect to the AOE is provided in Table 1.1.

Table 1.1 Summary of recent consultation in respect of the Alde-Ore Estuary

Consultee	Consultation Type	Comment or summary of response	Applicant's response
Natural England	Meetings on: 31 st March 2021, 15 th May 2021 and 15 th June 2021	Initial and follow-up discussions on developing compensation collaboratively and/or strategically in relation to ornithology.	The Applicant is fully supportive of these efforts and is continuing to engage with these discussions and/or take the lead as required.
Defra			
ScottishPower Renewables			
Natural England	2 nd June 2021	Comments on Norfolk Boreas Limited's draft response to the Secretary of State's request for additional information.	Advice received was incorporated into the updated version of this document.

Consultee	Consultation Type	Comment or summary of response	Applicant's response
Natural England	8 th June 2021	Meeting to discuss Natural England's advice on the draft response to the Secretary of State's request for additional information	The opportunity to further explore issues and concerns was welcomed, and has informed this submission.
Natural England	9 th June 2021	Meeting to discuss opportunities for ScottishPower Renewables and Vattenfall Wind Power Ltd to collaborate to deliver compensation where the same in principle compensation measures have been proposed for the Norfolk Vanguard, Norfolk Boreas and East Anglia ONE North and East Anglia TWO projects	The continued constructive discussions were welcomed.
ScottishPower Renewables			
Natural England	23 rd June	Comments on Norfolk Boreas Limited's draft response to the Secretary of State's request for additional information.	Advice received was incorporated into the updated version of this document.

20. The Applicant has also had initial positive discussions with landowners with regard to potential locations for the proposed compensation.
21. Following this introduction, section 2 of this document provides a description of the AOE SPA. Section 3 quantifies the predicted effect of the project on the AOE SPA. Section 4 considers the guidance on compensation and sets out in principle compensation measures for Norfolk Vanguard and the AOE SPA, including how these measures may be secured.

2 ALDE-ORE ESTUARY SPA

2.1 Overview

22. The Alde-Ore Estuary SPA covers 2,417ha and is located on and around the Suffolk coast, 92km from the proposed Norfolk Vanguard Offshore Wind Farm at its closest point. The SPA comprises an estuarine complex of the rivers Alde, Butley and Ore. The Alde-Ore Estuary was also listed as a Ramsar site in October 1996 for its internationally important wetland assemblage. The SPA citation was published in January 1996 and the site was classified by the UK Government as an SPA under the provisions of the Birds Directive in August 1998. The site is coincident with the Alde-Ore Estuary Site of Special Scientific Interest (SSSI), which was notified in 1952, with the SSSI boundary being identical to that of the SPA and Ramsar sites. The SPA/Ramsar site also forms part of the Alde-Ore and Butley European Marine Site. There is also a partial overlap with the Orfordness – Shingle Street Special Area of Conservation (SAC).

23. There are several important habitats within the Alde-Ore Estuary site, including intertidal mudflats, saltmarsh, vegetated shingle (including the second-largest and best-preserved area in Britain at Orfordness), saline lagoons and semi-intensified grazing marsh. The diversity of wetland habitat types present is of particular significance to the birds occurring on the site, as these provide a range of opportunities for feeding, roosting and nesting within the site complex. At different times of the year, the site supports notable assemblages of wetland birds including seabirds, wildfowl and waders. As well as being an important wintering area for waterbirds, the Alde-Ore Estuary provides important breeding habitat for several species of seabird, wader and birds of prey. During the breeding season, gulls and terns feed substantially outside the SPA (JNCC 2011a). The Suffolk Wildlife Trust, the National Trust and the RSPB have nature reserves within the SPA.
24. The Joint Nature Conservation Committee's (JNCC's) SPA site description (as published in 2001) indicates that the Alde-Ore Estuary qualifies as an SPA under Article 4.1 of the Birds Directive (79/409/EEC) by regularly supporting populations of Annex I species of European importance: breeding populations of little tern, marsh harrier and Sandwich tern, and avocet (both breeding and wintering). The site also qualifies under Article 4.2 of the Birds Directive by supporting two Annex II species - a wintering population of redshanks, and a breeding population of lesser black-backed gulls, the designation of the lesser black-backed gulls being based on 14,074 breeding pairs (4 year mean peak, 1994-1997). At designation, the site regularly supported 59,118 individual seabirds during the breeding season, including: herring gull, black-headed gull, lesser black-backed gull, little tern and Sandwich tern.
25. Following the UK SPA review (Stroud et al. 2001) additional Article 4.2 qualifying features were identified as needing protection: a breeding seabird assemblage of international importance (at least 20,000 seabirds) and a wintering waterbird assemblage of international importance (at least 20,000 waterbirds).

2.2 Conservation Objectives

26. The Conservation Objectives for the site 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, 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 the qualifying features within the site.

27. When the site was classified in 1996, breeding lesser black-backed gull were present in internationally important numbers (Natural England, 2014); the 4 year peak mean (1994-1997) was 14,070 breeding pairs (derived from the JNCC Seabird Monitoring Programme database; agreed by Natural England's Chief Scientist in 2012). However, after a peak of 23,400 pairs in 2000, numbers reduced significantly below the target; the 5 year peak mean (2011-2015) was 1,940 breeding pairs (Joint Nature Conservation Committee (JNCC), 2014).
28. Natural England has stated the target is to restore the size of the breeding population to a level which is above 14,074 whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.

3 QUANTIFICATION OF EFFECT ON THE AOE SPA

3.1 Summary of Revised Collision Risk Modelling

3.1.1 Norfolk Vanguard alone

- 3.1.2 At the close of the Norfolk Vanguard Examination the wind farm design comprised 180 x 10MW turbines with a minimum draught height (the gap between the lower rotor tip and the sea level at Mean High Water Springs, MHWS) of 27m, which was a refinement from the DCO submission which was based on 200 x 9MW turbines with a draught height of 22m (from MHWS).
29. Following the close of Examination, the Applicant undertook further investigations into the design envelope and committed to additional design restrictions in order to further reduce the predicted collision risks. Additional mitigation proposed by the Applicant was detailed in full in document reference ExA; Mit; 11.D10.2 ('Additional Mitigation') submitted on 28th February 2020.
30. In summary, this includes the following measures:
 - Reduced maximum number of turbines from 180 to 158, by increasing the minimum turbine size from 10MW to 11.55MW; and
 - Increased draught height:
 - Minimum draught height increased from 22m to 35m (above MHWS) for turbine models up to and including 14.6MW capacity; and
 - Minimum draught height increased from 22m to 30m (above MHWS) for turbine models of 14.7MW and above.
31. At these two draught heights (30m and 35m) the worst case turbine options (with respect to collision risk) are the 14.7MW and 11.55MW respectively, and of these

two the overall worst case collision predictions are obtained for the 14.7MW turbine model.

32. Using Natural England's preferred CRM parameters (which the Applicant considers to be highly precautionary), the annual lesser black-backed gull mortality apportioned to the Alde-Ore Estuary SPA has reduced from 5 individuals (at the close of the Examination) to 2.6 (95% confidence intervals 0.1 – 7.1); this update has been agreed by Natural England. Using the Applicant's preferred parameters the reduction is from 2.8 to 1.6 individuals (the Applicant has derived these parameters from a robust analysis of available evidence).
33. Thus, the 14.7MW turbine at 30m has predicted collision risks which are 51% lower for lesser black-backed gull compared with the estimate submitted at the close of the project Examination for the 10MW turbine at a draught height of 27m and up to 73% lower compared with the original DCO application.
34. Natural England has agreed with the Applicant that impacts for the project alone do not cause any AEoI on any SPA population, and therefore the request for compensation is not with respect to Norfolk Vanguard alone.

3.1.3 In combination

35. The in-combination total lesser black-backed gull collisions assigned to the Alde-Ore Estuary SPA from all wind farms predicted to have connectivity, most recently, were provided for the Norfolk Boreas Examination in Norfolk Boreas Limited's Assessment Update Cumulative and In-combination Collision Risk Modelling ([Norfolk Boreas Examination library reference: REP6-024], see Norfolk Boreas Document Index ExA.AS-4.D12.V1).
36. Using the Applicant's estimate for Norfolk Vanguard of 1.6, the total in-combination lesser black-backed gull collision risk for the Alde-Ore Estuary SPA population is estimated to be 53.2, which increases to 54.2 if the Natural England estimate of 2.6 is used.
37. Therefore, Norfolk Vanguard's contribution to the total, which was already small, has been reduced still further; using Natural England figures it is 4.8% ($=2.6/54.2$) and using the Applicant's figures it is 3.0% ($=1.6/53.2$).
38. The Applicant has presented further analysis of the potential impact of the in-combination mortality which clearly concludes there will be no AEoI of the AOE SPA due to in-combination lesser black-backed gull mortality (see Norfolk Boreas Offshore Ornithology Assessment Update [REP2-035] and the Assessment Update Cumulative and In-combination Collision Risk Modelling [REP6-024]). Furthermore,

the Galloper offshore wind farm was consented on the basis of project alone collision risk for this population estimated at that time by Natural England to be 119, and in-combination risk of 270-357, which is clearly considerably higher than either the project alone (2.6) or in-combination (54) for Norfolk Vanguard.

39. Following the project mitigation outlined, the contribution to the in-combination total from Norfolk Vanguard, which was already small, is now even smaller and it is appropriate that this is taken into consideration with respect to the scale and timescale for delivery of compensation measures (if any).

4 COMPENSATION

4.1 Guidance

40. Following a conclusion by the Competent Authority that, following Appropriate Assessment, an AEoI on a Natura 2000 site(s) cannot be ruled out, that there are no alternative solutions and that there is IROPI, Article 6(4) of the Habitats and Birds Directive *“requires that all necessary compensatory measures are taken to ensure that the overall coherence of the network of European sites as a whole is protected.”*
41. Defra (2012) and EC (2012 and 2018) explain that, for SPAs, the overall coherence of the Natura 2000 Network can be maintained by:
- compensation that fulfils the same purposes that motivated the site's designation;
 - compensation that fulfils the same function along the same migration path; and,
 - the compensation site(s) are accessible with certainty by the birds usually occurring on the site affected by the project.
42. The guidance provides an element of flexibility, recognising that compensation of a ‘like for like’ habitat and/or in the same designated site may not be practicable.
43. Compensation should not be used to address issues that are causing designated habitats or species to be in an unfavourable condition. This is the responsibility of the UK Government.
44. Ideally, compensation should be functioning before the effect takes place, although it is recognised that this may not always be possible, as stated in the EC (2012) guidance:

“in principle, the result of implementing compensation has normally to be operational at the time when the damage is effective on the site concerned. Under

certain circumstances where this cannot be fully fulfilled, overcompensation would be required for the interim losses.”

45. In line with the guidance, indicative compensation options for collision risk to lesser black-backed gull at the AOE SPA are summarised in Table 4.1 and could include:
- Prey enhancement;
 - Predator control / mortality reduction;
 - Productivity improvement; and
 - Enhancement of adult survival.

4.2 Review of Potential Compensation Measures – Measures suggested in the Defra report

46. In a report to Defra, Furness et al. (2013) suggested possible measures that could improve the conservation status of UK seabird populations. These are summarised for lesser black-backed gull in Table 4.1.

Table 4.1 Measures listed in the Defra report (Furness et al. 2013) to improve conservation status of lesser black-backed gull populations at colonies throughout the UK

Type of measure	Suggested method plus in parentheses comments on suitability in relation to the key SPA population
Prey enhancement	Closure of sandeel and sprat fisheries close to colonies (not likely to be beneficial for Alde-Ore Estuary SPA population).
Predator control / productivity improvement	Exclude foxes (expected to be highly beneficial at Alde-Ore Estuary SPA).
Enhance adult survival	End culling under General Licences (this was put into effect by Defra in 2019).

47. Only some of these measures presented in Table 5.1 would be appropriate for the focal SPA populations of AOE SPA for reasons summarised in comments in Table 5.1 and further expanded on below.
48. In addition, knowledge of seabird ecology has advanced in the six years since publication of the Defra report, as has policy in relation to General Licences, so the suitability of these measures requires further consideration in relation to new evidence.
49. Furthermore, following consultation with the RSPB and the National Trust, who manage nature reserves within the AOE SPA, it is apparent that while predator control is expected to be the most beneficial measure for this population, other factors may also play a role, including vegetation management and human disturbance.

4.3 Prey enhancement - Closure of sandeel fisheries close to the AOE SPA

4.3.1 Overview

50. Numbers and breeding success of lesser black-backed gulls may be influenced by the abundance of sandeels in the local sandeel stock. However, although lesser black-backed gulls certainly do feed to some extent on sandeels while breeding, studies of diet, and tracking of breeding adults, suggest that this is not an important component of their diet. For that reason, changes to sandeel fishery management are unlikely to represent a strong measure for compensation in relation to lesser black-backed gull.

4.3.2 Delivery Mechanism

4.3.2.1 Define a closed area for sandeel fishing

51. The primary North Sea sandeel fishery areas are not within foraging range of lesser black-backed gulls from the Alde-Ore Estuary SPA, therefore benefits to this population of such an action would be negligible.

4.3.3 Spatial Scale

52. Lesser black-backed gulls from the Alde-Ore Estuary SPA do not forage on the Dogger Bank, which is the focus of the North Sea sandeel fishery, therefore measures to enhance sandeel prey would not be beneficial for this population.

4.3.4 Feasibility

53. Since this compensatory measure would not be expected to deliver any benefits for the population the Applicant is not proposing to progress this option.

4.4 Predator control / Productivity improvement - Establish an area within Alde-Ore Estuary SPA that is protected by predator-proof fencing for lesser black-backed gulls to nest

4.4.1 Overview

54. Lesser black-backed gulls can be adversely affected by rats, although there seems to be little evidence relating to the role of rats as predators at the Alde-Ore Estuary SPA lesser black-backed gull colonies. Numbers of lesser black-backed gulls breeding at the Alde-Ore Estuary SPA have declined dramatically since 2000. A part of that decline could be related to reductions in the availability of fisheries discards (Sherley et al. 2020). While a range of factors are considered likely to have contributed to the declines in the colony, including vegetation changes and human disturbance, it

appears that predation by foxes has been a significant factor. At Orford Ness, in 2000, 75% of nests (in a colony of 23,000 pairs), failed due to fox predation (Mavor et al. 2001). Breeding numbers at Orford Ness fell from 24,000 pairs in 2001 to 6,500 pairs in 2002 due to fox activity at the colony because fox control was not carried out there in 2002 (Mavor et al. 2003). Numbers of lesser black-backed gulls breeding at Orford Ness have now declined to a few tens of pairs, all of which have nested on the rooftops of buildings there, which further supports the hypothesis that this species is now unwilling to nest on the ground at Orford Ness because of the impact of mammal predators (notably foxes) on breeding success.

55. In the UK, some examples of using electric fences to exclude foxes from colonies have been partially successful, but electric fences are not fully effective in excluding predators and require frequent maintenance. A more expensive but much more effective alternative is the use of predator-proof fences, such as deployed in Hawaii at Ka'ena Point Natural Area Reserve (Young et al. 2012). These 2m tall fences were set up in November 2010 to February 2011 around 20 ha of coastal habitat within Ka'ena Point to prevent predators (including rats and mice) from entering the protected area. Predators (in their case dogs, cats, mongoose, rats and mice) were eradicated within the enclosed 20ha. This was the first predator proof fence constructed in the United States at the time of its completion (Young et al. 2012). Such completely predator-proof fencing would be particularly appropriate for colonies subject to predation by rats or American mink as well as by foxes. Similar predator-proof fences have been established at many sites around the world with very high success in protecting birds from mammal predators (VanderWerf et al. 2014, Ruykys and Carter 2019).
56. By 2006, in total, around 109 km of predator-proof fencing had been erected in various areas of mainland New Zealand to exclude predators from sites with important populations of native animals and birds (Scofield et al. 2011, Innes et al. 2012, Scofield and Cullen 2012, <https://predatorfreenz.org/sums-best-predator-control-options>).
57. There are several examples of the use of predator-proof fences to protect seabirds from mammals (<https://www.acap.aq/index.php/news/latest-news/1359>). A predator-proof fence completed in 2007 stretches 10.6 km across the neck of the peninsula from coast to coast at Cape Kidnappers Peninsula, North Island, New Zealand. This fence protects a privately owned and financed seabird restoration project where grey-faced petrels and Cook's petrels are being re-introduced (Furness et al. 2013). Another good example of successful deployment of a predator-proof fence to protect a seabird colony is one erected in 2001 to protect 36-ha on Pitt Island (Chatham Islands, New Zealand) from feral cats and pigs. Between 2002 and

2005, 200 endangered Chatham petrel chicks from the only known breeding site on South East Island (Chatham Islands) were moved into the fenced reserve. In 2012, 17 pairs from these translocated birds returned to breed (Furness et al. 2013). In Europe, predator-proof fencing has been used very successfully to protect breeding seabirds from alien invasive mammal predators in Azores (Portugal), funded by EU LIFE+ (<https://www.xcluder.com>).

4.4.2 Delivery Mechanism

58. In-principle compensatory measures have been requested for the lesser black-backed gull feature of the AOE SPA for other offshore wind farms currently being promoted (e.g. Norfolk Boreas and Scottish Power Renewables' East Anglia ONE North and East Anglia TWO projects), and the same compensation measures have been proposed in respect of those projects as set out in this document. If required, the proposed compensatory measures could be delivered independently by one project, or the measures could be delivered as a joint form of mitigation since the magnitude of compensation which this would provide far outweighs both the individual and combined effects of the projects which have been requested to provide in-principle compensation measures. For this reason, the Vattenfall Wind Power Ltd and Scottish Power Renewables have agreed to work collaboratively to deliver this compensation measure. This is discussed in further detail within section 4.7 of this document.
59. It seems very likely that provision of a nesting area from which mammal predators are excluded would be a highly effective conservation measure for this population and it is apparent that part of Orford Ness would be suitable for lesser black-backed gulls to nest if an area was made fox-proof. Establishing a protected area for lesser black-backed gulls at Orford Ness would also reduce the conflict between recovering gull breeding numbers and protecting avocets and other ground nesting birds from gull predation at Havergate Island.
60. It has been demonstrated not only that seabird breeding success can be very much higher in areas within predator-proof fences, but also that seabird breeding numbers tend to recover rapidly when given such protection. This method would be much more effective than attempting to reduce fox numbers by shooting foxes, as there will always be movement of foxes into the area from the surrounding wider countryside where fox numbers are high. In addition, predator proof fences exclude rats and American mink as well as other mammal predators such as feral cats, so provide very much more effective protection than any attempts simply to control fox numbers in the area.

61. For clarity, the Applicant's proposal relates to installation of 'New Zealand' style fencing. This will be more effective than the electric fencing which Natural England has informed the Applicant is currently used at the site.

4.4.3 Spatial Scale

62. Predator-proof exclusion fencing is expensive, costing around £100 per metre to construct, and around £1 per metre per year to maintain, with a life-span in New Zealand of around 25 years, so a considerable rate of depreciation (Scofield et al. 2011). However, maintenance costs and life span will depend very much on the environment where the fencing is set up. In New Zealand, where much of the fencing is in forested habitat, trees falling onto the fence can cause expensive damage, as can cyclones (Scofield et al. 2011). In the predominantly open habitat of UK seabird colonies such fencing would be under less risk of damage, although corrosion from salt spray would be a consideration. There are several companies providing predator-proof fencing.
63. Enclosing an area of approximately four hectares (e.g. a square with 200m long sides) would require a minimum of 800m of fencing at a construction cost of £100/m, so £80,000 with annual maintenance costs of approximately £800. It is however recognised that the final footprint and design of the compound will reflect a variety of factors such as topography, habitat and other constraints such as designations and landscape features. Therefore an irregular shape which takes these sensitivities into account may be more appropriate.
64. It is probably not appropriate to enclose an area much smaller than four hectares in order to minimise the risk that the birds do not use the enclosed space (and as noted above, careful siting would be important, see below for further detail). This scale of enclosure would provide for orders of magnitude of more successful nesting pairs than necessary to compensate for the potential loss of 2.6 birds at Norfolk Vanguard. For example, lesser black-backed gull nest density at the SPA probably averages less than 1 pair per square metre, therefore within an enclosure of 40,000m² the target restored population of 14,000 could be contained, even allowing for the fact that not all the habitat within the enclosure would be expected to be suitable. The degree of over-compensation obtained through this measure would therefore be able to compensate for a number of wind farms with impacts of a similar scale to those predicted for Norfolk Vanguard (i.e. projects with small numbers of collision predictions).
65. Success of the compensation would be determined through annual monitoring of breeding numbers and success within the SPA using standardised breeding seabird survey methods. An increase in the number of pairs, and/or breeding success of the

same size, or greater than, Norfolk Boreas's predicted impact (or multiple projects) would be considered to signify successful compensation. It can be estimated that 28 pairs would produce 14 juveniles (average productivity is 0.5/pair) and 50% of these would be expected to reach adult age, so 7 individuals. This corresponds to the upper 95% confidence interval collision estimate. Therefore to achieve a 3:1 over-compensation ratio a target of 84 breeding pairs within the enclosure is appropriate.

66. The time taken to 'pay back' a mortality debt depends on several factors which are difficult to predict (e.g. rate of colony growth, and starting size), however under even very modest assumptions of how many birds would initially begin to breed in the enclosure (e.g. 25 pairs) and how quickly this number would increase (e.g. by 20% per year) and a low productivity rate (0.5 chicks per pair), it can be seen that the colony's cumulative production of adults (i.e. allowing for a five year lag between chick production and reaching maturity) overtakes the project's cumulative mortality (i.e. the sum of mortality at Norfolk Vanguard over time) within 5 to 6 years (Figure 1). The model assumes no density dependent limits on gull population growth, which is likely to be a reasonable assumption for the first few years, but thereafter the growth rate would be expected to slow. However, this does not detract from the results since the key phase is the first few years during which the compensation is achieved (the point when the lines in Figure 1 cross).

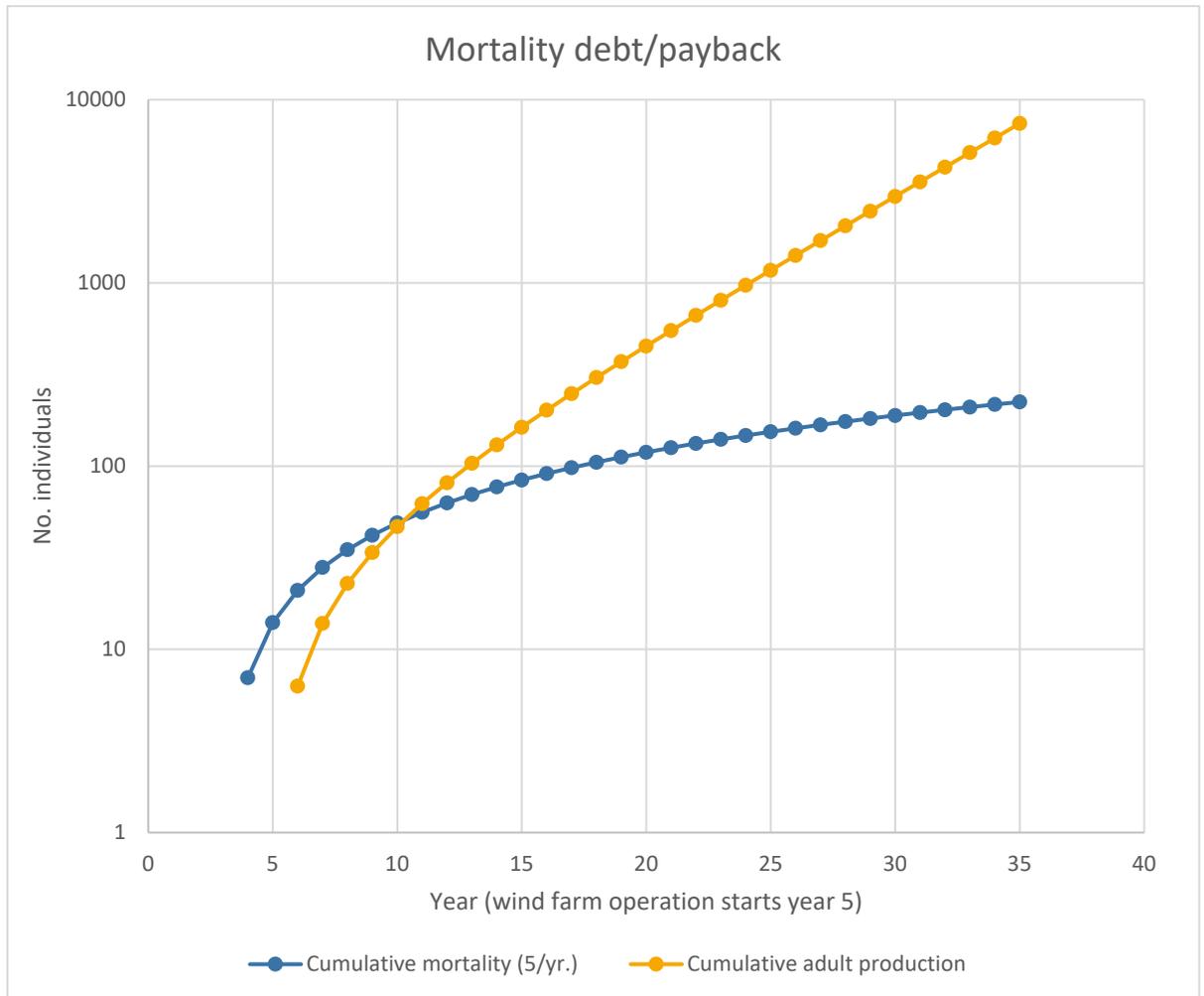


Figure 1. Plot of accumulated lesser black-backed gull mortality at rate of 7 birds/year (blue line) and cumulative production of 5+ year old adults from birds within the enclosure (orange line), under assumption of initial colony of 25 pairs, colony growth of 20%/year and productivity of 0.5 birds per pair. Compensation has been achieved when the lines cross.

67. Table A1 of Appendix 1 gives examples of mortality debt payback based on different annual colony growth rates or initial colony size. These modelling outputs indicate that slower rates of colony growth have a small effect on when the lines cross (i.e. mortality debt payback). If the annual colony growth rate is halved to 10%, the time to payback (when the lines cross) is delayed by two to three years and at 5% it is delayed by eight to nine years. However, it is important to note that these projections still assume a small initial colony size of only 25 pairs. If this is increased to an initial size of 30 pairs, even at the slowest rate of modelled colony growth of 5% the mortality is paid off after seven years. These estimates have been calculated assuming the new enclosure is available for the birds to begin breeding from four years prior to wind farm operation. Therefore, each year of delay before the

enclosure becomes available will move the orange line in Figure 1 to the right by 1 year. However, it is clear that a delay of 1 to 2 years before the enclosure is available will only delay the wind farm mortality debt being cleared by a small amount, even with the very precautionary assumptions made in this model projection (and it should also be noted that these calculations are based on the upper 95% confidence interval of mortality of 7, rather than the mean of 2.6). Given the rapid ability for the measures to achieve over-compensation there is therefore no requirement for the measures to be in place and operating 4 years before the impact (i.e. when the wind farm becomes operational).

68. As noted above, the same compensation measures have been proposed by other offshore wind farm projects and if required, these proposed compensatory measures could be delivered independently by projects, or the measures could be delivered as a joint form of mitigation since the magnitude of compensation which this would provide far outweighs both the individual and combined effects of those projects. This is discussed further in section 4.7.
69. Key to this process is recognition of the small number (2.6 birds per year) for which compensation may be appropriate, in the context of the massive decline in breeding numbers of lesser black-backed gulls at Alde-Ore Estuary SPA from tens of thousands of pairs at site designation to a few hundred pairs at present. Recovery of that population requires much stronger management action than has been taken up to now, and Norfolk Vanguard is willing to contribute in a proportionate way to that important conservation action. For example, at Galloper Wind Farm 22 lesser black-backed gull collisions were predicted for birds from the SPA (on the basis of equivalent modelling methods to those used at Norfolk Vanguard), which represents more than a third of the in-combination total of 54. A proportionate contribution from Norfolk Vanguard might therefore be around 20% of the level of contribution made by Galloper, and the Applicant considers that the above outline fencing proposal is in line with this level of contribution.
70. The proposed fencing is likely to be located in the Orford Ness National Nature Reserve (ONNNR) or adjacent land. This coastal area is covered by the Suffolk Coast and Heaths AONB, which is a national level designation, designated in 1970 with the purpose of conserving and enhancing the habitats and biodiversity of the special heathlands, woodlands, estuaries and coast. The AONB designation highlights the sensitivity of the estuarine and coastal landscapes covered by the ONNNR and it is in this context that special care and consideration will be required in the siting and design of the proposed fencing. The Applicant will seek to work closely with the AONB partnership to ensure the enclosure is designed and located sympathetically with the environment.

71. Ordnance Survey maps and aerial photography of the ONNNR show that it comprises two main areas; an area comprising vegetation and marsh on the southern side of the River Ore; and an area comprising shingle between Stony Ditch and the North Sea. To the immediate north of the ONNNR, lies a site referred to as 'Cobra Mist' named after the Long Range Surveillance Radar System that was developed here by the U.S. Military in the late 1960s and early 1970s. The main structures comprise 12 towers and a control building. When the Radar System was found not to work, this site was used by The Foreign Office and BBC World Service.
72. Maps and aerial photography show that this area is relatively well modified by human influences, with the land having been drained, and drainage channels and ponds used to control internal water levels, and rough grasses and scrub colonising the undeveloped land. A visitor attraction at the ONNNR is the Former Military Testing Centre, which comprises a series of old buildings, and a disused airfield. There is a network of tracks across the ONNNR ensuring a good level of access which extends into the Cobra Mist site to the north. Although this landscape is flat and exposed with only low-lying vegetation, an embankment wraps around the waterfront, offering some degree of protection from rising water levels. The extent of built development, most notably the 12 large towers, detracts from the remoteness and naturalness of this coastal landscape.
73. A sensitive approach to the siting of the proposed fencing should consider locating it along existing man-made lines in the landscape, such as access tracks, old field boundaries or collections of buildings. This would help to reduce the extent to which the baseline landscape would be changed or disrupted. At the same time, some of the existing buildings and landscape features have historical significance, and it would be important to ensure the fence does not detract from these or their setting.
74. Furthermore, if there is the opportunity to use the inside edge of the embankments to backcloth the fencing this would help to reduce visual impacts, especially in such an exposed and low-lying coastal landscape. Although the embankments are unlikely to be high, they would provide some cover to the proposed fencing which is expected to be approximately 2m in height. All of these constraints will be taken into account when identifying the area to fence, the materials to be used and how the fences will be installed in order to minimise visual impacts.
75. The proposed location is also within the Orfordness - Shingle Street Special Area of Conservation (SAC), the Alde, Ore and Butley Estuaries SAC, and the Alde Ore Estuary SSSI. Sensitive or designated features which form part of these designations would also be taken into consideration when siting the proposed fencing.

76. In terms of the selection of the fencing, the examples of the 'Xcluder' brand (<https://www.xcluder.co.nz>) would appear appropriate both in terms of providing a highly effective functional solution but also presenting a fairly sympathetic appearance for this rural location. The use of natural materials, such as timber posts would help to create a slightly more naturalistic appearance, and the style of fence sections used would be ones which combined the necessary functionality whilst also being as unobtrusive as possible. The option to use paints to create a colour match with the natural vegetation of this area will be explored, and this will further help to ensure the fence has the lowest visual impact possible whilst still operating as required to exclude predators.

77. In summary the principles used when siting the proposed fencing would be as follows:

- Position so that existing landscape features screen fencing where possible
- Make use of existing linear features within the landscape to minimise intrusive aspects
- Use materials and colours that are sympathetic to the landscape
- Avoid siting fencing close to historical buildings
- Where possible avoid existing rights of way and permitted footpaths to prevent inconveniencing walkers
- Site fencing sympathetically to the setting of historical buildings located within the area
- Avoid sensitive or designated features associated with designated sites including:
 - Features of the Orfordness - Shingle Street SAC
 - i. H1150 Coastal lagoons
 - ii. H1210 Annual vegetation of drift lines
 - iii. H1220 Perennial vegetation of stony banks
 - Features of the Ore and Butley Estuaries SAC
 - i. H1130 Estuaries
 - ii. H1140 Mudflats and sandflats not covered by seawater at low tide
 - iii. H1330 Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
 - Features of the Alde Ore Estuary SSSI / SPA
 - i. Coralline Crag at Gedgrave
 - ii. mudflats,
 - iii. saltmarsh,
 - iv. brackish lagoons,
 - v. shingle beach,
 - vi. reedbeds,

- vii. grassland,
 - viii. freshwater and brackish ditches.
 - SPA breeding features
 - i. pied avocet,
 - ii. marsh harrier,
 - iii. sandwich tern,
 - iv. little tern.
 - SPA non-breeding features
 - i. pied avocet,
 - ii. ruff,
 - iii. common redshank.
 - Use of natural (e.g. wooden posts) and environmentally friendly materials (e.g. minimise plastic) to align with the management values.
78. Following initial site investigations, potential fence locations will be developed and provided to appropriate consultees (e.g. Natural England, Historic England, Suffolk Coast and Heaths AONB team, local planning authority, landowners, etc.) for feedback and discussion. This will ensure that all relevant points of view are included in the siting and design and that the final decisions reflect those discussions.

4.4.4 Timescale

79. The Applicant's original proposal included an initial appointment of a coordinator to lead on stakeholder consultation and collation of evidence following which agreement would be sought on the most appropriate course of action to take. Although it was proposed that this process would begin prior to wind farm operation, it was not considered possible to guarantee that all of the steps would have concluded, and that the compensation would be fully in place, prior to wind farm operation. Since the close of the Examination the Applicant has continued discussions with Natural England and has also held discussions with Defra. There has been positive ongoing engagement since the close of the Examination, such that the requirement for a feasibility study and working group is no longer considered necessary (however it is recognised by the Applicant that stakeholder engagement is still key). However, it is recognised that there may be constraints to delivering the compensation which could delay its implementation, including agreeing an appropriate location and ensuring that area chosen can be appropriately managed.
80. It is currently expected that compensation can be delivered prior to wind farm operation (as per the delivery plan, section 4.9). However, in recognition that there may be unforeseen delays in implementation it is worth comparing the relative size of the impacts being compensated in comparison to the degree of compensation

that is expected to be achieved. The latter (compensation) is several orders of magnitude greater than the former (predicted impact), which means that even if there is a delay of one to two years in implementation (over the current timetable), any mortality 'debt' accrued during that time will be rapidly and comprehensively repaid once the compensation becomes operational (as discussed above, section 4.4.3).

81. This approach is also considered appropriate given the small magnitude of the contribution to the in-combination impact from Norfolk Vanguard, which is less than 5% of the total. Hence, an appropriate timescale for implementing the various measures, based on the small scale of impact from the project and the predicted large magnitude of success, would be agreed with the Secretary of State in consultation with Natural England as part of the approval of the agreed strategy. This approach is considered appropriate given the large degree of over-compensation (even if it is delivered jointly to provide compensation for multiple projects) that is anticipated from this proposal and is in line with the EC (2012) guidance.
82. As an alternative longer-term option, a strategic fund could be set-up and administered by an appropriate body to deliver a fenced area, in an appropriate location, for multiple projects. This option is discussed further within section 4.7. If such a mechanism became available in the timescales required for the project, the Applicant would be willing to support this.

4.4.5 Management and Monitoring

83. The most important monitoring requirement will be to check the integrity of the fence. A detailed inspection will be undertaken prior to each breeding season to determine the presence of any breaches in the fence, holes underneath, potential weak spots, etc. with prompt remedial action for any problems detected. Depending on the problem found it may also be necessary to thoroughly check the interior of the enclosure for any predators which have gained entry. These would either be herded out or live-trapped (the preferred options) or lethal control measures used, if other options are unsuccessful. In addition to the detailed annual inspection prior to the breeding season, regular checks (e.g. weekly) will be conducted during the breeding season to ensure the integrity is maintained.
84. Initially monitoring of the breeding population would be undertaken every year, however the requirement for this to be maintained for the lifetime of the project would be discussed with Natural England following completion of an agreed initial period of years (e.g. three) and conducted as agreed thereafter. These discussions would also be informed by the results of the monitoring, which could also indicate the need for additional management measures (i.e. adaptive management) should

the success of the compensation be deemed below that required. This could take the form of providing nesting platforms (for example if the ground proves liable to flooding) or using decoys and call playback to encourage birds to settle.

85. Depending on the location selected and the nature of existing management, there may be a requirement to manage the vegetation within the enclosure to provide and maintain suitable habitat for the gulls to nest. Such work would be undertaken outside the breeding season to avoid disturbance and would also need to be done in accordance with suitable management for other designated features if present. This vegetation management will also offer a degree of flexibility in how the area is maintained. For example, it may be considered that a mosaic of vegetation types will provide the most suitable conditions, and this may be best achieved by varying the locations cut back each year. It will only become apparent what management is required once the site has been finalised, and thereafter the habitat will be monitored on an annual basis and managed accordingly.

4.4.6 Feasibility

86. The Applicant considers that predator control to improve the breeding success of lesser black-backed gull at AOE SPA is a feasible measure and further details are provided in section 4.6.

4.5 Enhance adult survival - End culling under General Licences

4.5.1 Overview

87. Gull breeding numbers may also have been influenced by human disturbance of nesting gulls, and control of gulls under General Licence. There has been considerable discussion of the species of birds that should be listed on General Licences. Although lesser black-backed gull is a feature of the Alde-Ore Estuary SPA, it had previously been legal for lesser black-backed gulls to be killed under General Licences throughout England. Numbers of birds killed under General Licences have not been monitored fully, but it is known that many thousands of lesser black-backed gulls have been killed under licences issued in England. For example, around 29,000 gulls, almost all lesser black-backed gulls, were killed under licence between 1999 and 2002 at Tarnbrook Fell alone (Mitchell et al. 2004).
88. Since April 2019, there has been a change in Defra policy, and lesser black-backed gull is no longer listed on Defra's General Licences for England, which may help to allow recovery of the population of this species
<https://www.gov.uk/government/publications/gulls-licence-to-control-them-to-protect-other-birds>.

89. Any changes in adult survival that would result from a reduction in culling might be expected to result in an increase in breeding populations and subsequent breeding success. However, without more information on the existing management regimes (throughout the UK), which are largely unavailable as record keeping was not a requirement, it is difficult to predict how long such effects may take to become apparent.

4.5.2 Monitoring

90. The most appropriate method for monitoring survival rates is through large scale marking programmes (e.g. fitting colour leg rings) with sustained re-sighting effort carried out across a range of sites and over several years (at least 10 for robust estimates). Such monitoring would need to be conducted at a scale which included populations which have been culled and which no longer will be. It is understood that the SPA population is not subject to culling itself (although it is unclear if this has always been the case) therefore ringing and re-sighting at this site would be unlikely to be sensitive enough to detect responses occurring more widely. It would also be very difficult to ascribe cause to any changes in survival observed.

4.5.3 Feasibility

91. There is no question that, if the AOE SPA population of lesser black-backed gulls had been subject to culling before April 2019, then cessation of this would compensate for the 2.6 losses predicted at Norfolk Vanguard. However, since this population is no longer culled, it is much less clear how reduced culling elsewhere (in the region or nationally) could be considered as compensation for the SPA. Furthermore, the Applicant has no control over such measures and it is therefore highly uncertain if or how this could be delivered. Therefore, the Applicant is not proposing to progress this option.

4.6 Proposed Approach to Delivery of Compensation (if required)

92. If compensation is deemed to be required following the Appropriate Assessment, the Applicant proposes that delivery of measures to improve breeding success of lesser black-backed gull at AOE SPA (expected to be through provision of a predator exclusion fence around a suitable area of the site) would be the most appropriate measure to deliver compensation (either alone or jointly with other projects that are required to deliver compensation- see section 4.7). The timetable for delivery of the measures would be approved by the Secretary of State in consultation with Natural England, with the aim that this would be initiated well in advance of operation of Norfolk Vanguard (see section 4.9 for the proposed timetable). If this was progressed for multiple projects this would be approached strategically, with the aim of

obtaining approval on a joint basis, and therefore initiated well in advance of the operation of the first project to proceed.

93. The measures which would be undertaken by the Applicant (either alone or jointly with other projects as appropriate) in order to improve breeding success, on the assumption that this would be a fenced enclosure, are as follows:
- A stakeholder working group will be convened, expected to comprise the Applicant (and other project companies where relevant), Natural England, relevant landowners and, if appropriate, other interested parties, such as Historic England, the relevant Local Planning Authority and representatives from the Suffolk Coast and Heaths AONB, to oversee the delivery of the compensation;
 - Candidate locations for the fenced area would be identified for discussion within the working group with the aim of agreeing the most suitable area to be taken forward given the site constraints and sensitivities and taking into account the features of other designated sites including the AONB;
 - Following identification of a suitable location, a contractor would be appointed to install the fence. While this may be timed for the nonbreeding season, unless the work was considered likely to cause disturbance to existing breeding birds there may be no particular need to do this outside the breeding season; and
 - The intention would be to have the complete package of measures in place prior to operation (of Norfolk Vanguard). However, as discussed above, the proposed scale of compensation (improved nesting conditions for several thousand pairs) far outweighs the contribution to losses from Norfolk Vanguard alone (2.6 birds per year), or that with other projects of a similar scale. Therefore, it is considered that should a short delay in achieving compensation occur this would not materially affect the long-term outcome or success of the scheme. In such circumstances, delayed 'overcompensation' is recognised as appropriate (EC 2012).
94. This compensation will be secured through the approval of a strategy by the Secretary of State, in consultation with Natural England. Given the delivery measures are proposed to an onshore SPA, it is proposed to consult the relevant Local Planning Authority and not the MMO on this strategy. If this is required for multiple projects then in the first instance approval would be sought for this to be undertaken jointly as a single scheme, with timescales being driven by the first project to be delivered.

95. The strategy would include timescales for delivery of measures as well as ongoing management and monitoring proposals (including dissemination of results) to establish the effectiveness of the measures. Monitoring results will be required to be submitted to the Secretary of State and Natural England, together with any proposals to address effectiveness, which would thereafter need to be implemented as approved by the Secretary of State.
96. Notwithstanding the Applicant's primary position that AEoI can be ruled out for the project alone and in-combination with other plans and projects, in-principle compensatory measures have been identified and can be delivered if required by the Secretary of State.
97. As set out in section 4.6.1.1 below, although in-principle, these compensatory measures can be adequately secured through the dDCO and would be enforceable by the Secretary of State.

4.6.1.1 DCO Condition

98. Schedule 17 of the draft DCO would be updated to include the following proposed condition to deliver measures to improve breeding success of lesser black-backed gull at the AOE SPA if the Secretary of State is minded to conclude an AEoI on the AOE SPA. Natural England has been consulted on the proposed wording and is in agreement with much of the principle of the wording, however agreement has not been reached on the inclusion of strict timeframes for consultation on the compensation strategy, which the Applicant does not consider it is necessary to include on the face of the DCO given the ongoing and iterative engagement.

Alde-Ore Estuary Special Protection Area: Delivery of measures to compensate for loss of lesser black-backed gull

1. In this Part—

“lesser black-backed gull compensation plan” means the document certified as the In Principle Habitats Regulations Derogation, Provision of Evidence, Appendix 2 Alde-Ore Estuary SPA In Principle Compensation by the Secretary of State for the purposes of this Order;

2. Prior to the operation of any wind turbine generator forming part of the authorised development, a strategy for the delivery of measures to compensate for the predicted loss of adult lesser black-backed gull from the Alde-Ore Estuary Special Protection Area as a result of the authorised development must be submitted to and approved by the Secretary of State, in consultation with the relevant statutory nature conservation body and the relevant local planning authority.

3. The strategy must accord with the principles contained in the lesser black-backed gull compensation plan, and in the event that the strategy proposes predator management measures it must include:

- (a) details of the location where the compensation measures will be delivered and the suitability of the site to deliver the measures;
- (b) a statement confirming how the necessary land and/or rights will or have been secured to deliver the measures;
- (c) details of designs of any predator control fencing including the type of fencing, and the area and location of enclosure;
- (d) an implementation programme for delivery of the measures;
- (e) a fencing maintenance schedule; and
- (f) proposals for monitoring and reporting on the effectiveness of the measures, including survey methods, success criteria, adaptive management measures, and timescales for the monitoring and monitoring reports to be delivered.

4. The strategy must be carried out as approved, unless otherwise agreed in writing by the Secretary of State in consultation with the relevant statutory nature conservation body and the relevant local planning authority.

5. Results from the monitoring scheme, including any proposals to address the effectiveness of the measures, must be submitted to the Secretary of State and the relevant statutory nature conservation body, and any proposals to address effectiveness must thereafter be implemented by the undertaker as approved in writing by the Secretary of State in consultation with the relevant statutory nature conservation body.

6. Unless otherwise agreed in writing by the Secretary of State or unless the measures have already been delivered, the undertaker must not commence construction of Work No. 1 until it has first—

- (a) provided a reasonable estimate of the cost of delivery of the compensation measures; and
- (b) put in place either—
 - (i) a guarantee in respect of the reasonable estimate of costs associated with the delivery of the compensation measures; or
 - (ii) an alternative form of security for that purpose, that has been approved by the Secretary of State.

7. Any predator proof fencing installed must not be decommissioned without written approval of the Secretary of State, in consultation with the relevant statutory nature conservation body.

8. The approved strategy includes any amendments that may subsequently be agreed in writing by the Secretary of State, in consultation with the relevant statutory nature conservation body and the relevant local planning authority. Any amendments to or variations of the approved strategy must be in accordance with the principles set out in the lesser black-backed gull compensation plan and may only be approved where it

has been demonstrated to the satisfaction of the Secretary of State that it is unlikely to give rise to any new or materially different environmental effects from those considered in the lesser black-backed gull compensation plan.

4.6.2 Proposed content of lesser black-backed gull compensation plan

99. Following advice from Natural England the lesser black-backed gull compensation plan will provide the following:

- What, where, when: clear and detailed statements regarding the location and design of the proposal.
- Why and how: ecological evidence to demonstrate compensation for the impacted site feature is deliverable in the proposed locations.
- Demonstration that deliverability is secured.
- Demonstration of the policy/legislative mechanism for delivering the compensation (where relevant).
- Set out clear aims and objectives of the compensation.
- Include proposals for adaptive management.
- Governance proposals for the post-consent phase (where relevant).
- Timescales for implementation including how these timescales relate to the ecological impacts from the development.
- Commitments to monitoring specified success criteria.
- Proposals for reporting on monitoring.
- Proposals for management of the compensation area to support the continued success of the compensation measures (where relevant).

4.7 Strategic compensation

100. As explained above, Vattenfall Wind Power Ltd is exploring options to work with Scottish Power Renewables' EA1N and EA2 projects to deliver this compensation measure collaboratively, and this could also include the Norfolk Boreas project. Following this expression of interest from Vattenfall Wind Power Ltd and ScottishPower Renewables to work collaboratively, Natural England approached Defra with a view to developing a strategic compensation option. Should the strategic measure be progressed by Defra, developers would either provide the fenced enclosure following Defra's negotiation of the necessary land rights, or provide a set level payment contribution referenced to the projects impact. A number of meetings were held between Natural England, Defra, ScottishPower Renewables and Vattenfall Wind Power Ltd, prior to and during the development of this compensation plan (as detailed in section 1.2.2.)

101. During this time, Defra and Natural England have engaged directly with potential landowners to gauge their interest in collaborating to deliver the proposed strategic compensation proposals for the AOE SPA. However, following those initial discussions, Defra has informed the Applicant that they will not be able to progress a strategic option which aligns with the timescales required for the project.
102. It is the Applicant's intention to continue to work collaboratively with ScottishPower Renewables to progress these compensation measures. This will also include continued engagement with Natural England and other stakeholders where appropriate to ensure that if compensation measures are necessary they are sufficiently progressed to be delivered within the appropriate and necessary timescales. Where joint compensation is not relevant as one or other of the parties is not required to deliver compensation the bullets listed under paragraph 105 outline the process which would be followed in order to deliver the compensation.

4.8 Evidence for acquisition or leasing of compensation sites

103. Following the initial engagement led by Defra and Natural England, the Applicant is now progressing discussions direct with those landowners who expressed an interest, with a view to negotiating voluntary agreements to secure interests in land necessary to deliver appropriate compensation.
104. Whilst these discussions are at an early stage, the Applicant does not consider that securing interests in land will be a barrier to the delivery of the compensation measure given the positive discussions held to date.

4.9 An implementation timetable for when the compensation measures will be delivered and achieve their objectives in relation to the first operation of the wind farm

105. If lesser black-backed gull compensation is deemed to be required by the SoS following the Appropriate Assessment, it is anticipated that the necessary management measures would be undertaken prior to operation of the wind farm. The following measures would be undertaken:
 - Appointment of relevant stakeholders to a stakeholder working group, tasked with overseeing the planning and implementation of the compensation (Q3 2021);
 - Following determination of the location to be fenced, the necessary ownership and access agreements would be obtained (Q4 2021 – Q2 2022);
 - If necessary, depending on the location and design of the fencing to be installed, planning permission (and any other necessary consents) would be sought (Q1-2 2022);

- Detailed designs would be finalised through the stakeholder working group, following which a specialist contractor would be appointed (Q2-3 2022);
- Following installation, any habitat management within the enclosure would be undertaken, together with trapping to ensure no mammals remained inside. The aim would be for the fence to be installed prior to wind farm operation, however owing to the large degree of over-compensation this scheme is expected to deliver, the mortality debt associated with a delay of 1 to 2 breeding seasons would be quickly recouped. For the same reasons (of over-compensation) there is no anticipated requirement for the fence to be installed several years prior to the predicted impact (Q3-4 2022); and,
- Annual monitoring would be undertaken to estimate breeding success. Regular checks would also be made of the fence (as set out in section 4.4.5) in order to quickly identify any areas of concern. These would continue for the lifetime of the project. The habitat within the enclosure would also be managed outside the breeding season to ensure it continued to provide suitable habitat for gull breeding.

4.10 Funding

106. As described above the proposed AOE SPA compensation will involve the installation and maintenance of a predator exclusion fence which will permit improved breeding conditions for lesser black-backed gulls. Estimated costs for each phase of the compensation are provided in Table 4.1.

Table 4.1 Indicative costs for proposed AOE SPA compensation.

Compensation Option	Cost Estimate subcategories	Norfolk Boreas cost estimate
Predator exclusion fence	Development Expenditure	£50,000
	Capital Expenditure	£150,000
	Operational Expenditure	£477,400
	Decommissioning Expenditure	£50,000
Total estimated cost		£727,400

107. Having regard to the estimated costs for delivery of the compensation measures set out above (as well as those measures which may be required for compensation in relation to the Flamborough and Filey Coast Special Protection Area and the Haisborough, Hammond and Winterton Special Area of Conservation), the Applicant considers that delivery of the measures, in line with the timescales proposed in the implementation programme, is financially feasible. Therefore, in the event that it is necessary to deliver these (and/or other) compensation measures, the Applicant is confident that the commercial viability of the project would not be prejudiced.

108. The Applicant provided a Funding Statement [APP-009] with the Application, which explains that the Applicant will have the ability to procure the financial resources necessary to fund the works to be authorised by the Order, subject to final Board authority. The Applicant's parent company (Vattenfall Wind Power Ltd), which is part of the wider Vattenfall Group (Europe's fifth largest generator of electricity and the largest generator of heat), have the experience and reputation to enable funds to be procured and this applies equally in respect of the funds to deliver the compensation measures. The Applicant will secure funding for the project after certainty is obtained on development consent, the tender process is complete for the major construction contracts, and the investment case has been satisfied. Once these criteria are met the Applicant will take a final investment decision (FID) which will irrevocably commit funding for the project. Should funding for any compensation measures be required as part of the project then these costs will be factored into any FID.
109. In summary, the Applicant, its parent company (Vattenfall Wind Power Ltd), and the wider Vattenfall Group have substantial net assets (as outlined in the accounts shown at Annex 1 and Annex 2 of the Funding Statement [REP8-009]) as well as a positive track record in the field of renewable energy development. The Applicant and the parent company are therefore able to provide the required funding for the project, which would include funding to guarantee the success of any compensation measures required.

Table 4.2 GANTT chart of the timeline for implementing lesser black-backed gull compensation.

Stage	2021		2022				2023				2024				2025				2026			
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1-4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4			
Appointment of stakeholder working group	■																					
Identification of enclosure to be fenced		■	■																			
Landowner agreements and other consents as required.		■	■	■																		
Finalisation of fence plans and contractor appointed				■	■																	
Fence installation						■	■															
Habitat management		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		
Breeding within enclosure							■	■		■	■		■	■			■	■				
Start of Norfolk Vanguard offshore construction													■	■	■	■	■					
First power generation																	■					

4.11 Summary

110. Table 5.1 provides a summary of the compensatory measures that have been reviewed by the Applicant in consultation with Natural England and Defra.
111. Whilst there is a range of potential measures to compensate mortality to lesser black-backed gull, only some of these measures would be appropriate for the focal SPA populations of the AOE SPA for reasons outlined above. The Applicant therefore proposes that measures to improve the breeding success, likely through predator control, are the most effective and deliverable within the timescales required for Norfolk Vanguard.
112. It is noted that compensation would only be required should the Secretary of State conclude that an AEoI on lesser black-backed gull at the AOE SPA cannot be ruled out and there is agreement on the Assessment of Alternative Solutions and IROPI case presented in the Applicant's Habitats Regulations Derogation Provision of Evidence (document reference: ExA; IROPI; 11.D10.3).
113. However, it is the Applicant's firm conclusion that there is no AEoI for the AOE SPA as a result of the project alone and in-combination with other plans and projects.

5 CONCLUSION

114. This document (and the equivalent document (document references 8.26 and ExA; IROPI; 11.D11.3.App3) which details compensation for the FFC SPA) has provided the additional ornithological information requested in the letter to the Applicant from the SoS dated 5th July 2021, comprising:
 - Updated cumulative and in-combination collision impacts for gannet and kittiwake;
 - Updated cumulative and in-combination displacement impacts for gannet, guillemot and razorbill;
 - Details of the proposed in-principle compensation for lesser black-backed gull at the AOE SPA, including how these have progressed since the previous request for further information;
 - Details of the proposed in-principle compensation for kittiwake at the FFC SPA, including how these have progressed since the previous request for further information; and,
 - Provision of in-principle compensation proposals for guillemot and razorbill from the FFC SPA; and,

- Consideration of reducing fishery bycatch as compensation for guillemot and razorbill (as requested by Natural England in their discretionary advice for the Norfolk Boreas request for information).
115. The Applicant's position remains that there will be no adverse effects on the integrity of any SPAs as a result of the Norfolk Vanguard wind farm, operating either alone or in-combination with other projects, and that on this basis there is no requirement for these compensation measures. Nonetheless, the Applicant has been actively engaging with relevant stakeholders to progress the compensation requested both during and since the Examination (for kittiwake from FFC SPA and lesser black-backed gull at AOE SPA and also guillemot and razorbill following the request from the SoS for these also to be considered), in order that these management measures can be implemented with minimal delay should the SoS determine they are required.

Table 5.1 Summary of In Principle Compensation Measures

Indicative Measure	Benefits	Delivery mechanism	Spatial scale	Timescale	Potential feasibility	Measure taken forward as compensation for Norfolk Vanguard
Prey enhancement	Partial or complete closure of sandeel fishery in UK North Sea waters would improve fish stocks. However, sandeels are not important in lesser black-backed gull diet during breeding and relevant fishery areas do not overlap with foraging ranges of lesser black-backed gull at AOE SPA.	✓ Define a closed area for sandeel fishery.	✓ For practical reasons this would need to be an area much in excess of that required to compensate for the loss of 2.6 lesser black-backed gull. However, closure of fishery outside this population's foraging range would be of limited benefit.	✓ Long-term, probably requiring >5 years for effects to become apparent at the colony. But uncertain if any effect would result.	? Currently no authority has the jurisdiction to deliver fisheries management areas for the purposes of compensation. The feasibility of this measure therefore requires government intervention.	x Due to the limited benefit to the AOE SPA population and uncertainty in deliverability of this compensatory measure in the timescales required for the project, the Applicant would not propose to progress this option.
Predator control	Lesser black-backed gull at AOE SPA are thought to be subject to high levels of egg and chick predation by mammals (especially foxes). Prevention of this predation would	✓ A working group of stakeholders (SNCB, LPA, wind farm developers, landowners) would oversee identification of suitable location of predator exclusion fence, following	✓ Enclosure of a suggested area of approximately 4ha, although this would be subject to discussion and agreement by the working group. Sensitively sited to minimise visual impact and potential impacts to other designated site features. Habitat management within	✓ Aim to install prior to wind farm operation, however short delays from intended timetable (e.g. 1-2 years) would be readily recouped through considerable degree of over-compensation.	✓ This option is considered to be entirely feasible and straightforward to monitor using surveys of the breeding population and reproductive success. Regular fence maintenance	✓

Indicative Measure	Benefits	Delivery mechanism	Spatial scale	Timescale	Potential feasibility	Measure taken forward as compensation for Norfolk Vanguard
	greatly enhance productivity and could more than compensate for the loss of 2.6 adults at Norfolk Vanguard.	which the Applicant would appoint a contractor to install 'New Zealand' style fence (wire mesh c. 2m high).	enclosure to maximise attractiveness and suitability for breeding lesser black-backed gulls if necessary and not part of existing management. This may also need to take into account the requirements of other site designations depending on the location.	This is considered acceptable and in accordance with EU Guidance.	and habitat management will further ensure the ongoing success of this measure.	
Enhance adult survival	Reduced culling of lesser black-backed gull under Defra's General Licences for England would assist in recovery of the population at a national scale.	N/A	N/A	N/A	x Defra's General Licences for England no longer lists lesser black-backed gull as a species which can be killed (since April 2019). This is likely to greatly reduce the number of this species culled.	x Not considered feasible for Norfolk Vanguard.

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APPENDIX 1 – MODELLED COLONY PRODUCTION OF ADULTS AGAINST ACCUMULATED COLLISION MORTALITY

Table A. 1 Modelled accumulation of collision mortality at Norfolk Vanguard against production of adults (assuming 5 years to maturation) and various colony growth rate and starting size assumptions. Shaded cell indicates years in which accumulated adult production exceeds accumulated mortality

Year	Norfolk Vanguard collision mortality (upper 95% c.i.) Wind farm operation in year 5	Accumulated mortality at Norfolk Vanguard	Production of adults (colony initialised in year 1)			
			Annual colony growth=20%, initial colony size = 25 pairs	Annual colony growth = 10%, initial colony size = 25 pairs	Annual colony growth = 5%, initial colony size = 25 pairs	Annual colony growth = 5%, initial colony size = 30 pairs
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	7 (operation starts)	7	0	0	0	0
5	7	14	0	0	0	0
6	7	21	6	6	6	8
7	7	28	14	12	11	17
8	7	35	23	19	17	26
9	7	42	34	27	24	35
10	7	49	47	35	31	45
11	7	56	62	45	38	55
12	7	63	81	55	45	66
13	7	70	104	66	53	78
14	7	77	131	78	61	90
15	7	84	163	92	70	103
16	7	91	202	107	79	116
17	7	98	249	124	88	130
18	7	105	305	142	98	144
19	7	112	372	162	108	160
20	7	119	452	184	119	176
21	7	126	549	208	131	193
22	7	133	665	234	143	211

Year	Norfolk Vanguard collision mortality (upper 95% c.i.). Wind farm operation in year 5	Accumulated mortality at Norfolk Vanguard	Production of adults (colony initialised in year 1)			
			Annual colony growth=20%, initial colony size = 25 pairs	Annual colony growth = 10%, initial colony size = 25 pairs	Annual colony growth = 5%, initial colony size = 25 pairs	Annual colony growth = 5%, initial colony size = 30 pairs
23	7	140	804	264	156	229
24	7	147	972	296	169	249
25	7	154	1172	331	183	270
26	7	161	1413	370	197	291
27	7	168	1702	413	213	314
28	7	175	2048	460	229	338
29	7	182	2464	512	246	363
30	7	189	2963	569	264	389
31	7	196	3562	632	283	417
32	7	203	4281	701	302	446
33	7	210	5144	777	323	476
34	7	217	6179	860	345	508
35	7	224	7421	952	367	542