

Norfolk Boreas Offshore Wind Farm

The Applicant's Response to the Request for Further Information

Applicant: Norfolk Boreas Limited
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Glossary of Acronyms

ExA	Examining Authority
HHW	Haisborough, Hammond and Winterton
HRA	Habitats Regulations Assessment
FFC	Flamborough and Filey Coast
NE	Natural England
PEIR	Preliminary Environmental Information Report
PVA	Population Viability Analysis
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SIP	Site Integrity Plan
SoS	Secretary of State
SPA	Special Protection Area
TCE	The Crown Estate

1 Secretary of State's Request for Further Information

On the 22 September 2021 the Secretary of State (SoS) published a letter requesting further information from Norfolk Boreas Limited (the Applicant) in relation to Necton substation, Dillington Hall Nature Recovery Project, the Flamborough and Filey Coast Special Protection Area (SPA) and the Haisborough, Hammond and Winterton Special Area of Conservation (SAC). This document includes the Applicant's response to that request for further information, along with Collision Risk Modelling (CRM) and Population Viability Analysis (PVA) reports with respect to both Alde-Ore Estuary SPA (document reference ExA.AS-2.D22.V1) and Flamborough and Filey Coast SPA (document reference ExA.AS-3.D22.V1) which also form part of this submission.

1.1 Necton substation

Paragraph number	Paragraph text	Applicant's Response:
3.	The Applicant is asked to consider and respond to the points raised by Interested Parties in relation to the Necton substation.	The Applicant's response to points raised by Interested Parties is provided in ExA.ASR.D22.V1 The Applicant's Comments on Interested Parties Representations.

1.2 Dillington Hall Nature Recovery Project

Paragraph number	Paragraph text	Applicant's Response:
4.	The Applicant and Natural England are asked to consider and respond to the recent email from <u>Dillington Hall Estate</u> highlighting that the Norfolk Boreas cable route will pass through the Wendling Beck Natural England Nature Recovery Project ("NRP"). Information is requested on any implications the NRP has in respect of the Application and confirmation or otherwise that the conclusions of the EIA remain valid.	<p>The Wendling Beck NRP proposal (included in Appendix 1) shows the alignment of the Norfolk Boreas cable route, which is described as "<i>The Wild Cable Route – The reinstatement of the Vattenfall offshore cable</i>". The NRP proposal indicates this will be a mixed grassland corridor, and it is evident that the NRP vision is to introduce this grassland corridor following the installation of the Vattenfall cables.</p> <p>The Norfolk Boreas construction programme was set out in the Project Description [APP-218], submitted in June 2019. Cable duct installation is reported to complete in 2023 (Scenario 1) or 2024 (Scenario 2) These construction completion dates have not changed since the application was submitted.</p> <p>The NRP includes the creation of a 3.4km wildlife corridor along the same alignment of the Norfolk Boreas cables. However, approximately 0.4km of this corridor is existing woodland and another 0.4km is existing marshy grassland, which will both be retained by the NRP. Both of these habitats already formed part of the existing Norfolk Boreas baseline and were taken into account in the assessment. An additional 0.2km of NRP wildlife corridor is currently scrub habitat, which was also considered a habitat of ecological value in the Norfolk Boreas assessment. As such, in terms of a change in land use the NRP will lead to 2.4km of existing arable reverting to grassland, which represents approximately 10ha of existing arable reverting to grassland (based on a 45m wide corridor).</p>

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		<p>The total area of grassland (excluding amenity and improved grassland) originally identified in the Norfolk Boreas baseline was 23.4ha. As the potential effects are of short duration and reinstatement would happen rapidly, the magnitude of effect was assessed to be negligible on a receptor of high importance, representing an impact of minor adverse significance. The additional 10ha of grassland created by the NRP would increase the total area of existing grassland within the Norfolk Boreas Order limits to approximately 33.4ha. However, the impact would remain temporary in nature and reinstatement would still happen rapidly and would remain an effect of negligible magnitude, on a receptor of high importance, representing an impact of minor adverse significance. On this basis, the conclusions of the ES as presented in Chapter 22 Onshore Ecology [APP-235] remain valid and do not change notwithstanding the potential future change in the baseline conditions associated with the Wendling Beck NRP.</p> <p>The draft DCO and associated outline documents to be certified contain commitments to ensure that the habitats present ahead of construction are fully considered, and that mitigation and reinstatement is agreed based on those pre-construction conditions, in consultation with Natural England and the affected landowners. If the Wendling Beck NRP introduces <i>"The Wild Cable Route – The reinstatement of the Vattenfall offshore cable"</i> and its associated change from arable to a grassland corridor, ahead of the Vattenfall works, then this would effectively represent a newly un-surveyed habitat and form part of an updated baseline that would be reflected in the mitigation for reinstatement of those affected land parcels. On this basis the Applicant does not believe there is any necessity to secure further commitments specifically related to the Wendling Beck NRP.</p> <p>The existing commitments are captured in the following outline documents which would be certified under the DCO:</p> <p>Outline Landscape and Ecological Management Strategy (OLEMS) [REP14-020]</p> <ul style="list-style-type: none"> • Table 5.1 <i>"Habitat - There will be post-consent surveys of all unsurveyed areas."</i> • Section 9.3.3.3 – <i>"All grassland habitats will be reinstated following the completion of works (either following completion of duct installation phase or following completion of cable pull phase where relevant)."</i>

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		<ul style="list-style-type: none"> Section 9.7.3.1.1 – “A Hedgerow Mitigation Plan will be developed in consultation with Natural England prior to the removal of hedgerows. This mitigation plan will be included within the EcoMP, secured through Requirement 24 of the DCO. This mitigation plan will detail the reinstatement approach for hedgerows removed during construction and the monitoring and maintenance requirements following hedgerow planting.” 9.11.3.3 – “Habitats suitable for supporting common reptiles would be fully reinstated either following completion of duct installation phase or following completion of cable pull phase where relevant.” <p>These are secured through DCO Requirement 24 Ecological Management Plan, which states “No stage of the onshore transmission works may commence until for that stage a written ecological management plan (which accords with the outline landscape and ecological management strategy as appropriate for the relevant stage) has been submitted to and approved by the relevant planning authority in consultation with the relevant statutory nature conservation body. The ecological management plan must be informed by post consent ecological surveying of previously un-surveyed areas for the relevant stage.”</p> <p>Outline Code of Construction Practice [REP18-019] - secured through DCO Requirement 20 Code of Construction Practice:</p> <p>“Appendix B – Role of the Agricultural Liaison Officer....</p> <ul style="list-style-type: none"> Coordinating the provision of a detailed pre-construction condition survey. Undertaking pre-construction and day-to-day discussions with affected parties to minimise disruption, where possible, to existing farming regimes and timings of activities. Undertaking site inspections during construction to monitor working practices and ensure landowners’ and occupiers’ reasonable requirements are fulfilled. Discussing and agreeing reinstatement measures following completion of the works.” <p>Following consideration of the Wendling Beck NRP proposal the Applicant concludes that the impact assessment presented in Chapter 22 Onshore Ecology [APP-235] remain valid. The draft DCO and associated outline documents secure commitments that any habitats</p>

Paragraph number	Paragraph text	Applicant's Response:
		<p>present ahead of construction are fully considered, and that mitigation and reinstatement is agreed, in consultation with the relevant statutory nature conservation body and landowner as appropriate, based on those pre-construction conditions. On this basis the Applicant does not believe there is any necessity to secure further commitments specifically related to the Wendling Beck NRP.</p>

1.3 Alde-Ore Special Protection Area

Paragraph number	Paragraph text	Applicant's Response:
5.	<p>In relation to the in-principle compensation measures proposed for the lesser black-backed gull feature of Alde-Ore Estuary Special Protection Area (SPA), the Applicant is asked to provide the following:</p> <ul style="list-style-type: none"> • An update on compensation site selection, along with details of when the site is expected to be secured. • Confirmation of how the purchase/ lease of the proposed site will be secured in the DCO. • Details of alternative compensation measures to be adopted, should the preferred compensation sites not be secured. • Updated Collision Risk Models (CRM) and Population Viability Analysis (PVA) for lesser black-backed gulls, using Natural England's latest advised avoidance rates; and a comparison with the counterfactual SPA population size after 30 years. In-combination assessments should include all projects up to and including Hornsea Project 3 	<p>The Applicant has developed the in-principle compensation proposals for the lesser black-backed gull feature of the AOE SPA over a period of 18 months, with the first submission at Deadline 6 (REP6-025) of the Examination on 5 March 2020. Considerable discussion and consultation has taken place between the Applicant and Natural England, as well as other stakeholders, over this period. This engagement also built on proposals which were already substantially developed over a considerable period for the Norfolk Vanguard project. Thus, even though the compensation proposals have been put forward without prejudice to the Applicant's primary case that a robust assessment has been provided which demonstrates there will be no adverse effect on the integrity (AEoI) of the SPA, the plans are now very well developed should they be requested by the SoS.</p> <p>To illustrate the process that has been undertaken, the timeline of development of the Alde Ore Estuary (AOE) SPA lesser black-backed gull compensation proposals is set out below:</p> <ul style="list-style-type: none"> • At Deadline 6 the Applicant (REP6-025) proposed that <i>'measures to improve the breeding success, likely through predator control, are the most effective and deliverable within the timescales required for Norfolk Boreas'</i>. • At Deadline 7 the Applicant (REP7-026), in response to a request from the Examining Authority (ExA), provided draft in-principle compensation proposals for the AOE SPA. This document introduced the key features of the proposed compensation for the Project: predator control to improve breeding success, which was expected to be most successful through installation of exclusion fencing (but with an intention to initially elicit stakeholder input through appointment of a

Paragraph number	Paragraph text	Applicant's Response:
		<p>coordinator to oversee production of an evidence review). An area of approximately 4ha was suggested as likely to offer considerable over-compensation.</p> <ul style="list-style-type: none"> At Deadline 9 Natural England (REP9-046) supported the in-principle proposals, stating <i>'Natural England welcomes the in principle compensation measures presented by Norfolk Boreas for lesser black-backed gulls (LBBGs) at the Alde-Ore Estuary SPA. We believe that these proposals are in principle heading in the right direction. But, Natural England's view is whilst the Applicant's proposal to fund of a project coordinator and scoping study is helpful, there must be a commitment to delivering measures on the ground that would offset the predicted collision risk mortality. Therefore, we have reviewed all of the options considered by the Applicant as compensation measures and we believe that predator proof fencing for LBBG at the Alde-Ore Estuary SPA has the most potential to be considered as an appropriate compensatory measure to address collision mortality impacts. However, there are other factors, including site suitability and management issues, which need to be considered in determining a suitable location for such fencing. Natural England considers that it is achievable to have a suitable location identified and a predator proof fence erected before the construction of the windfarm.'</i> At Deadline 10, the Applicant (REP10-033) agreed with Natural England that a fence would be the most suitable option, as had been previously proposed. At Deadline 11, the Applicant (REP11-013) submitted a formal version of the in-principle compensation proposal (previously submitted at Deadline 7). At Deadline 15, Natural England (REP15-009) stated: <i>'With regard to the Applicant's proposed updates to the dDCO regarding compensation for Alde-Ore Estuary SPA lesser black-backed gulls, as the condition now states that the strategy must include predator fencing and be submitted before any offshore works commence, and that predator fencing must then be put in place before the turbines are operational, and in the context of the predicted level of impact from Norfolk Boreas, we are satisfied with these amendments.'</i> At Deadline 16, Natural England (REP16-024) stated: <i>'Natural England refers the ExA to our advice provided at deadline 9. However, since deadline 9 we have</i>

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		<p><i>agreed an updated derogation condition with the applicant that requires predator management measures to be agreed and in place prior to energy generation at the windfarm. Natural England welcomes the further commitment made by the updated wording and considers this is a significant step towards ensuring the compensatory measures. We have provided the applicant with some limited additional advice regarding where there may be options to implement predator management measures and advised they seek to identify the land owners. However, we note that time within examination is highly limited and that to locate landowners and agree the management measures within the remaining time is unlikely in such a short time.'</i></p> <ul style="list-style-type: none"> • Also at Deadline 16, the Applicant (REP16-004) responded to questions from the ExA about how compensation, if required, would be secured. Various location options were noted, several of which had been identified in discussion with Natural England, leading to a high degree of confidence that landownership would not be a barrier to delivery. • At Deadline 17, the Applicant (REP17-004) reiterated that a range of land options were available and there was therefore confidence that one could be secured if required. On this basis the Applicant considered it is unreasonable (and unrealistic) to expect landowners to spend time and resource engaging in detailed discussions unless and until a requirement for compensation had been determined by the SoS. Nonetheless, the Applicant agreed to take steps to identify and make initial contact with relevant parties in order to explore options for predator management and to minimise subsequent delays post consent should this compensation be required. • On the 28th April 2021, the SoS, with respect to the AOE SPE compensation proposals, requested details of strategic options, evidence for site acquisition or leasing and an implementation timetable for delivery and objective achievement. • On the 28th May 2021, the Applicant provide an updated AOE SPA in-principle compensation proposal which addressed the SoS's 28th April requests. This summarised efforts made by Natural England and Defra to develop strategic compensation, but which ultimately were considered by Defra to be beyond the Project's required timeline. Nonetheless the Applicant has continued to work with other relevant developers to progress compensation options. The Applicant also

Paragraph number	Paragraph text	Applicant's Response:
		<p>confirmed that discussions were underway with landowners identified as supportive by Defra, and that land rights was still not regarded as a barrier. The proposed timetable for putting the compensation in place was also provided.</p> <ul style="list-style-type: none"> On the 9th July 2021, the SoS sought comments on the submissions made by the Applicant on the 28th May. On the 20th August 2021 Natural England submitted their response to the SoS's letter dated 9th July. This response contained references to revised collision avoidance rates which Natural England advised should be used. A response to this point is provided in this table (below) and more detail is contained in the Updated Population Viability Analysis Flamborough and Filey Coast SPA (ExA.AS-4.D22.V2). Natural England also provided detailed comments on the proposed compensation. The Applicant considers the majority of Natural England's comments (20th Aug), which were focussed on the detail of the AOE SPA compensation, cover points of minor disagreement which would be straightforward to resolve post consent. However Natural England stated they disagree that identification of a compensation site should be left until after a consent decision. Natural England also stated that they disagreed with the DCO wording with respect to the timing of plan delivery. <p>At the close of the examination matters relating to compensation measures were largely agreed between the Applicant and Natural England. Natural England stated that they accepted the Applicant had undertaken reasonable steps to develop the compensation proposals and agreed these were adequately secured in the dDCO. Since then Natural England's position on compensation appears to have changed, and they now appear to be applying a position more akin to that adopted for onshore projects in cases where it has already been accepted that adverse effect on integrity will arise.</p> <p>This undoubtedly influences the degree to which proposals can be developed prior to consent. The request to provide offshore compensation proposals is much more recent and best practice approaches are still being developed to facilitate this, unlike the tried and tested measures previously adopted onshore. More importantly, the degree of detail which can be provided can only be commensurate with the level of agreement on whether AEol arises (and therefore whether compensation is or is not, in fact, required). The reasons why</p>

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		<p>AEoI arises, and the features affected, will influence the type of compensation required as well as its location, such that a determination (or agreement) on this is required before proposals can be fully developed. Similarly, agreement on the scale of the impact is also essential because this influences the location(s) and design of the compensation measures to be provided.</p> <p>Under these circumstances it is not reasonable or practicable to expect the Applicant to progress significantly beyond in principle discussions with landowners or to secure separate planning permission for the measures (where this would be required). In any event, doing so would not necessarily provide evidence of deliverability unless agreement had been reached on the most suitable location and structure. If land agreements and planning permission are obtained for compensation measures before they are agreed and/or approved, there is a risk that agreements and permissions will need to be revised to reflect different, final approved measures to be taken forward. In practice, landowners also request a level of certainty on the type and design of compensation measures to be hosted so that this can be incorporated in land agreements before they are entered into. Indeed, the SoS appeared to recognise these practical issues in the consent award for Hornsea Project Three which did not require compensation proposals to be developed to the extent Natural England are now requesting.</p> <p>Nevertheless, the Applicant has continued to progress the compensation proposals as far as possible, to give all interested parties confidence that these could be delivered in the event they are required by the SoS. Further details on the individual aspects of the latest request for additional information are provided below.</p> <p><u><i>An update on compensation site selection, along with details of when the site is expected to be secured.</i></u></p> <p>As noted in the above timeline, the Applicant progressed potential compensation site options initially with the assistance of DEFRA. A number of potential sites in the Orford Ness area, close to, or within the AoE SPA were considered. The short timescales involved and the lack of certainty as to whether compensation measures would be required, including the form and scale they would ultimately take, reduced the ability of some of those parties to assist in delivery of the compensation at that particular point in time. However, the Applicant (working with the Norfolk Vanguard project, and in collaboration with ScottishPower Renewables (SPR)) has identified a suitable preferred location for the</p>

Paragraph number	Paragraph text	Applicant's Response:
		<p>delivery of lesser black back gull compensation in the event that it is deemed necessary by the Secretary of State.</p> <p>The land parcel in question is situated within the Alde Ore Estuary SPA and is owned by Cobra Mist Ltd. The Applicant is currently negotiating Heads of Terms with Cobra Mist Ltd with a view to ultimately securing a lease of the site in the event that compensation for the lesser black gull feature of the AoE SPA is deemed necessary by the SoS. The letter included in Appendix 3 confirms that Cobra Mist Ltd is supportive of the Applicant's proposals. The Applicant considers that given that the current derogation case is proposed on a without prejudice basis, and it cannot be assumed that compensation will be required, it is not appropriate to progress negotiations beyond Heads of Terms. As explained above, until the scale of impact, and hence degree of compensation required, has been determined by the SoS, the precise area of land and the precise terms for acquiring an interest in the land sufficient to deliver the type of compensation which the SoS may ultimately approve following consent award is not yet known. Until this point, flexibility to use alternative sites, or alter the precise boundaries of the land or the terms on which it is to be acquired, needs to be maintained in the event that the preferred site, or detailed proposals put forward by the Applicant are not approved by the Secretary of State (for whatever reason).</p> <p>Notwithstanding this, in order to progress land negotiations as far as possible for a without prejudice case, the Applicant has undertaken a site visit with an experienced ornithologist who has confirmed that the habitat in the proposed area is suitable to provide any compensation which may be required by the SoS. The habitat was noted as being similar to that recorded in studies of breeding success in this species (Ross-Smith et al. 2015), and that vegetation management in the nonbreeding season would also maintain and enhance its suitability. Lesser black-backed gulls were also observed breeding on the roofs of adjacent buildings, from which colonisation of the site would readily occur. As a consequence of these positive findings the Applicant is progressing negotiations of the necessary documents but it is not expected that these will be entered into until the requirement for compensation has been fixed and agreed.</p>

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		<p>Ross-Smith, V., Johnston, A. and Ferns, P.N. (2015) Hatching success in Lesser Black-backed Gulls <i>Larus fuscus</i> - an island case study of the effects of egg and nest site quality. <i>Seabird</i>, 28, 1-16.</p> <p><u>Confirmation of how the purchase/ lease of the proposed site will be secured in the DCO.</u></p> <p>In response to the Secretary of State's request for information dated 9 July 2021, the Applicant submitted draft conditions which could be included in the DCO to secure the compensatory measures (presented in 'Extract of Schedule 19 to the draft DCO Compensation to protect the coherence of the Natura 2000 Network' (ExA.AS-1.D22.V1) submitted on 21st October 2021). At that stage, the relevant conditions for each compensatory measure were also included in the respective In Principle Compensation Appendix. However, noting that the SoS may wish to modify the draft conditions proposed, the conditions have been removed from the relevant Appendix but are still contained in a standalone extract of Schedule 19 to the dDCO (ExA.AS-1.D22.V1) submitted 21 October 2021, which has also been updated to address some comments from Natural England and the RSPB.</p> <p>As can be seen from Part 2 of draft Schedule 19, conditions have been proposed to secure compensatory measures for lesser black-backed gull. In particular, paragraph 2 requires submission to the Secretary of State of a lesser black back gull compensation strategy for the Secretary of State's approval. The strategy must be submitted no later than 18 months prior to the operation of any wind turbine generator forming part of the authorised development. As outlined under paragraph (4)(b), the strategy must include a statement confirming how the necessary land and/or rights will or have been secured to deliver the measures. The strategy must then be carried out as approved unless otherwise agreed with the Secretary of State.</p> <p>Therefore, the Applicant considers that the requirement to evidence that the necessary land rights have or will be secured to deliver the compensatory measures is already adequately secured within draft Schedule 19 already proposed. Indeed, this is similar to the approach which the SoS took in granting consent for Hornsea Project Three, where a condition of the DCO required that the compensation plan to be submitted for approval by the SoS contains "<i>details of landowner agreements demonstrating how the land will be bought or leased</i>".</p>

1.4 Flamborough and Filey Coast Special Protection Area

Paragraph number	Paragraph text	Applicant's Response:
6.	<p>In relation to the in-principle compensation measures proposed for the kittiwake feature of Flamborough and Filey Coast SPA, the Applicant is asked to provide the following:</p> <ul style="list-style-type: none"> An update on compensation site selection, along with details of when the site(s) is expected to be secured. 	<p>The Applicant has continued to progress negotiations with the Port of Lowestoft and several sites within the port have been identified as being suitable by both parties. During 2021 the Applicant has also undertaken a detailed study of kittiwake breeding site preferences and success rates at artificial breeding sites along the North Sea coast between Dunbar and Lowestoft. The results of this will be used to ensure that whichever site in the port is selected, the conditions will be optimised for successful kittiwake nesting.</p> <p>The Applicant has been negotiating Heads of Terms with the port and is at an advanced stage in this process, as indicated in the letter included in Appendix 3. For the reasons identified above in relation to lesser black-backed gull, it is not considered reasonable or practical to require the Applicant to progress negotiations for necessary land rights beyond heads of term stage. As explained above, until the scale of impact, and hence degree and nature of compensation required, has been determined by the SoS, the precise area of land and the precise terms for acquiring an interest in the land sufficient to deliver the type of compensation which the SoS may ultimately approve following consent award is not yet known. Until this point, flexibility to use alternative sites, or alter the precise boundaries of the land or the terms on which it is to be acquired, needs to be maintained in the event that the preferred site, or detailed proposals put forward by the Applicant are not approved by the Secretary of State (for whatever reason).</p> <p>Notwithstanding this, in order to progress land negotiations as far as possible for a without prejudice case, the Applicant, in discussion with the landowner and following a site visit with an ornithologist, has identified a number of potential locations which are considered suitable and appropriate for installation of a structure. These have been informally discussed with Natural England, along with presentation of the structural designs, to provide an opportunity for feedback into both aspects. Comments received have been used to refine the plans.</p> <p>Finally, in the event that additional, or alternative, locations beyond those identified at Lowestoft Port are required, discussions with landowners at other nearby locations including those within Great Yarmouth Borough Council and Peel Ports Great Yarmouth Port</p>

Paragraph number	Paragraph text	Applicant's Response:
		landholdings are also being progressed, as indicated by the letters in Appendix 3 of this document.
6.	<ul style="list-style-type: none"> Confirmation of how the purchase/ lease of the proposed site(s) will be secured in the DCO. 	<p>In response to the Secretary of State's request for information dated 9 July 2021, the Applicant submitted draft conditions which could be included in the DCO to secure the compensatory measures presented in Extract of Schedule 19 to the draft DCO (ExA.AS-1.D22.V1). At that stage, the relevant conditions for each compensatory measure were also included in the respective In Principle Compensation Appendix. However, noting that the SoS may wish to modify the draft conditions proposed, the conditions have been removed from the relevant Appendix but are still contained in a standalone extract of Schedule 19 to the dDCO (ExA.AS-1.D22.V1), which has also been updated to address some comments from Natural England and the RSPB.</p> <p>As can be seen from Part 1 of draft Schedule 19, conditions have been proposed to secure compensatory measures for kittiwake. In particular, paragraph 2 requires submission to the Secretary of State of a kittiwake compensation strategy for the Secretary of State's approval. The strategy must be submitted no later than 18 months prior to the operation of any wind turbine generator forming part of the authorised development. As outlined under paragraph (4)(b), the strategy must include a statement confirming how the necessary land and/or rights will or have been secured to deliver the measures. The strategy must then be carried out as approved unless otherwise agreed with the Secretary of State.</p> <p>Therefore, the Applicant considers that the requirement to evidence that the necessary land rights have or will be secured to deliver the compensatory measures is already adequately secured within draft Schedule 19 already proposed. Indeed, this is similar to the approach which the SoS took in granting consent for Hornsea Project Three, where a condition of the DCO required that the compensation plan to be submitted for approval by the SoS contains "<i>details of landowner agreements demonstrating how the land will be bought or leased</i>".</p>
6.	<ul style="list-style-type: none"> Details of alternative compensation measures to be adopted, should the preferred compensation sites not be secured. 	<p>Alternative compensation could take the form of different measures or different sites (or both). In the current case of in-principle kittiwake compensation, the Applicant identified two measures, provision of nesting structures and reduction of the North Sea sandeel fishery.</p> <p>The Applicant considers provision of artificial nesting structures to be the most feasible and deliverable option. Lowestoft remains the Applicant's preferred location for this and</p>

Paragraph number	Paragraph text	Applicant's Response:
		<p>discussions between Vattenfall, SPR and ABP continue positively with a view to securing a lease for the land in question should compensation be deemed necessary by the SoS. In the event that alternative, or additional, locations beyond those identified at Lowestoft Port are required, discussions with landowners at other nearby locations such as those within Great Yarmouth Borough Council and Peel Ports Great Yarmouth landholdings are also being progressed, as indicated by the letters in Appendix 3 of this document.</p> <p>Although provision of an offshore structure for kittiwake to nest on has been considered, this is not currently being taken forward since it introduces considerable additional challenges, including the ongoing ability to monitor usage and breeding success etc. Therefore, alternative onshore locations are strongly preferred before an offshore option would be considered.</p> <p>As detailed in the Applicant's compensation submissions (e.g. REP11-012), the only other potentially suitable measure identified in the Defra review of seabird compensation (Furness et al. 2013) is a reduction or closure of the sandeel fishery which operates on the Dogger Bank. However, while the Applicant would strongly support such a measure if brought forward by Government as part of a strategic measure to provide compensation, it is not considered feasible or deliverable for the Applicant to progress this independently. Indeed, these challenges of deliverability for developers have been accepted and acknowledged by Natural England (see Natural England's cover letter submitted on 20 August 2021 in response to the SoS's letter dated 09 July 2021). Therefore beyond an offer of support where a strategic option is made available, it is not possible for the Applicant to progress this as an option within the timescales that may be required. However, as requested by Natural England, the draft conditions for the DCO have been drafted to enable some flexibility to include this should it become available in the future.</p>
6.	<ul style="list-style-type: none"> Updated CRM and PVA for kittiwake and gannet, using Natural England's latest advised avoidance rates; and a comparison with the counterfactual SPA population size after 30 years. In-combination assessments should include all projects up to and including Hornsea Project 3. 	<p>The Applicant was first made aware that Natural England had commissioned the British Trust for Ornithology (BTO) to undertake a review of collision avoidance rates at the end of July 2021. This work, unlike its predecessor (Cook et al. 2014), commissioned by Marine Scotland Science, was not to the Applicant's knowledge consulted on outside of the UK statutory conservation advisors. In contrast, Cook et al. (2014) had an advisory steering group, comprising representatives from statutory agencies, non-statutory agencies, regulators, developers and ornithological consultants. While the latter approach will likely have extended the duration of the Project it also ensured that all relevant stakeholders</p>

Paragraph number	Paragraph text	Applicant's Response:
		<p>were involved in the process. In contrast, Cook (2021) was published on the BTO website on the 20th August 2021 with no opportunities for review or consultation before that date.</p> <p>Following review of this report, and assisted by the fact that the data and analysis scripts were also provided on the BTO website, the Applicant's ornithology consultant has been able to examine the methods and results closely. A review of this report is provided in Appendix 2, but in summary the Applicant is concerned that the analysis and results contained in Cook (2021) are flawed for the following reasons:</p> <ul style="list-style-type: none"> • There is considerable variation in the suitability and robustness of the individual studies which underpin the analysis; • Examination of the contribution from each study to the overall outputs has identified one in particular which exerts a strong influence on the avoidance rate estimates (this point clearly meets the definition of a statistical outlier); • There are strong evidential reasons why this study should not be included, due to a very short and unrepresentative period of study, and in fact this study was rejected for inclusion in Cook et al. (2014) on these grounds. There is no explanation provided in Cook (2021) for its subsequent inclusion; • Removal of this one study (1 row of data from 415 appropriate to the all gull avoidance rate) increases the avoidance rate advised for use with kittiwake from 98.74% to 99.13%. Compared with the current kittiwake avoidance rate (98.9%) a rate of 99.13% would reduce predicted collisions by 21% (i.e. from 14 to 11 apportioned to the FFC SPA), while including this data point would increase predicted collisions by 14% (i.e. from 14 to 16 apportioned to the FFC SPA). <p>For these reasons the Applicant does not consider the avoidance rate recommendations in Cook (2021) to be based on robust considerations of the available data. The Applicant also notes that no official Natural England guidance on the use of these rates has been made available. It is therefore considered premature for collision modelling to be undertaken using the revised rates.</p> <p>It is also not possible to update the collision estimates for other wind farms included in the cumulative and in-combination assessments using the Cook (2021) recommended avoidance rates because these were estimated using a different nocturnal activity rate</p>

Paragraph number	Paragraph text	Applicant's Response:
		<p>(25%) than has been advised until relatively recently by Natural England (50%). Because the avoidance rate estimation compares Band model predictions with observed mortalities, the results are specific to the suite of model input parameters used. For this reason the Cook (2021) avoidance rates, methodological concerns aside, cannot be applied retrospectively (unless a 25% nocturnal rate has been used for a previous wind farm).</p> <p>The above notwithstanding, in order for the SoS to have all the necessary information on which to base conclusions, collision risks have been recalculated using the alternative avoidance rates (and nocturnal activity rates) in Cook (2021). These are provided in Appendix 2.</p> <p>In the same document updated PVA outputs are provided as requested for the Project alone and in-combination.</p> <p>Importantly, having undertaken this additional assessment, the Applicant has concluded that even using the alternative avoidance rates recommended by Cook (2021) there is no material difference to the assessments. The collision risk at Norfolk Boreas for FFC SPA kittiwakes, taking into account the alternative avoidance rate and lower nocturnal activity rate, actually reduces from 14.0 to 13.9 individuals. Using the Natural England PVA tool, this level of mortality would not lead to a decline in the current population and would only reduce the population growth rate by 0.016% above that predicted in the absence of Norfolk Boreas. It is clear therefore that, the above concerns about Cook (2021) notwithstanding, there is still no risk of AEoI as a result of in-combination impacts, and the Applicant's previous conclusions on AEoI remain completely unaffected by the proposed changes.</p>

1.5 Haisborough Hammond and Winterton Special Area of Conservation

Paragraph number	Paragraph text	Applicant's Response:
7 (i)	<p>In respect of the in-principle compensation measures for the reef and sandbank features of Haisborough, Hammond and Winterton Special Area of Conservation (SAC), the Applicant is asked:</p> <ul style="list-style-type: none"> To confirm the number of marine debris retrieval campaigns to be completed during the lifetime of the project. 	<p>Following the desk based assessment for potential areas of marine debris and seabed surveys to confirm presence, a single marine debris retrieval campaign is highly likely to be sufficient to deliver the appropriate compensation especially given that the worst case size of effect is very small (up to 2ha).</p> <p>Therefore the Applicant would propose to undertake a single campaign and this would be detailed in the compensation strategy which will be submitted for approval by the SoS. If during the development of the strategy and following the desk based review it became clear that a further marine debris retrieval campaign might be required at a later date during operation of the wind farm this could be agreed through approval of the compensation strategy by the Secretary of State. The Haisborough, Hammond and Winterton SAC In Principle Compensation document has been updated (and Version 3 has been submitted on 21 October 2021) to clarify this.</p> <p>The Applicant also notes that within its Sandbanks Compensation Strategy, Hornsea Project Three committed to a single campaign. Therefore, the principle of a single campaign appears to have been accepted by the SoS, even for a project which has a far greater worst case area of effect than Norfolk Boreas, such that a single campaign can be considered appropriate for this Project.</p>
7 (i)	<ul style="list-style-type: none"> To identify the existing oil and gas infrastructure proposed for removal, along with an update on engagement with the current owners of such infrastructure. 	<p>The Applicant has continued discussions with Defra, OPRED and owners of oil and gas infrastructure to identify further infrastructure that could be removed. OPRED have confirmed again that they do not believe that removal of oil and gas infrastructure is a viable option for the Norfolk Boreas and Norfolk Vanguard projects, and therefore are not able to provide any further support during this consultation.</p> <p>Defra have provided the Applicant with a report titled "<i>Review of rock and other protective material use in offshore oil and gas operations in the UK Continental Shelf</i>" (Genesis 2020) which demonstrates that between 2011 and 2016 an area of 44,299m² was impacted by seabed deposits made by the Oil and Gas industry to protect assets within the Haisborough Hammond and Winterton SAC; namely rock protection, concrete mattresses and grout bags. A geospatial database of these deposits was compiled for the report and the Applicant has requested this information from OPRED (who commissioned the report). However, OPRED have since responded indicating that they do not hold this data and are therefore</p>

Paragraph number	Paragraph text	Applicant's Response:
		<p>unable to provide it. The Applicant will continue to seek this information, which if received would enable the Applicant to identify which protection was placed for projects that are now out of service or will be in the near future.</p> <p>In the absence of this report the Applicant has used publicly available data from the Oil and Gas Authority (acquired in 2021) and from Global marine (acquired in 2020) to identify those oil and gas and subsea cable assets which are late life, out of service, or decommissioned and are located in the HHW SAC and contacted the owners.</p> <p>Thus, in addition to the consultation undertaken with OPRED and Helix (see the Applicants response to the Request for Further Information submitted on the 25 June 2021 (document reference ExA.PD.D19.V1) the Applicant has now also consulted with Perenco, ENI UK and ONE-Dyas in order to investigate other opportunities for the removal of surface laid oil or gas pipelines and/or associated infrastructure. Consultation with these companies has occurred as follows:</p> <ul style="list-style-type: none"> • Perenco (Davy and Arthur developments) – email response on 6 October 2021 • One-Dyas (Sean field development) – Meeting on 12 October 2021 • ENI UK (Hewett Field) – Meeting on 12 October 2021 <p>Although possible opportunities for removal have been identified by the Applicant through these consultations, it is apparent that there is currently little scope (Despite Natural England's advice that there is significant opportunity for removal of oil and gas surface laid infrastructure within the HHW SAC) for the Applicant to fully deliver compensation through decommissioning of surface laid infrastructure alone or in line with the timeframes currently being requested by Natural England and the Wildlife Trusts. The reason for this can be summarised as follows:</p> <ul style="list-style-type: none"> • Oil and gas operators are duty bound to decommission their own assets at end of life • The comparative assessment process may identify surface laid infrastructure for removal where safe to do so, if it was a risk to other marine users • This would then be removed as part of the decommissioning process • Buried or partially buried infrastructure would likely be left in situ for environmental/and or reasons of safety

Paragraph number	Paragraph text	Applicant's Response:
		<ul style="list-style-type: none"> • It is therefore unclear what could be left for a third party to decommission in order to deliver compensation • The asset remains a lifetime liability of the asset owner with regard to monitoring and safety • Therefore, the asset would need to be divested (e.g. bought by) to the third party in order for them to decommission it. <p>The above could potentially limit the amount of compensation which could be delivered within appropriate timeframes through removal of surface laid oil and gas infrastructure, to that infrastructure which has been decommissioned in situ but has since become re-exposed and any associated material which has been placed to protect other sea users (for example recently placed rock dump). Other than the 0.83km of pipeline within the HHW SAC associated with the decommissioned Camelot Field (see Helix Letter of comfort in Appendix 1 Request for Further Information submitted on the 25 June 2021 (document reference ExA.PD.D19.V1)), it is currently not possible to quantify the volume of such infrastructure that could be available for decommissioning, although the Applicant's understanding is that this could be relatively limited. In any case, this would still, at that point, be the responsibility of the asset owner to remedy either by making safe or ultimately removal if absolutely necessary. This then reintroduces the potentially significant legal complications around divestment and responsibility, which could potentially only be required for relatively small sub-sections of pipelines and any associated protection. Other important factors must be considered such as the promotion of reuse of pipelines for CO₂ capture and transport by the OGA, the uncertainties around decommissioning programmes which are dependent on the desire of an asset owner to maximise value in response to fluctuations in gas prices and other commercial considerations. This means with regard to assets due to be decommissioned in the short to medium term, there is some uncertainty as to when any compensation could be delivered to fit with planned construction programmes.</p>
7 (ii)	<p>The Applicant is also asked to provide:</p> <ul style="list-style-type: none"> • Details of modifications to the Norfolk Boreas project, which would avoid the need for all cable rock protection within the SAC (except for cable crossing points). This should include the provision 	<p>The Applicant has committed to not place rock protection within the HHW SAC and therefore no modifications to the Project would be required to avoid the need for cable rock protection within the HHW SAC.</p>

Paragraph number	Paragraph text	Applicant's Response:
	<p>of more detailed information on micro-siting and/or the use of marker buoys to protect unburied cables, by identifying their location.</p>	<p>With regards to placing cable protection within the HHW SAC, the Applicant has investigated ways that this could be avoided including the following:</p> <ul style="list-style-type: none"> <p>Site selection: As explained in REP11-008: The Applicant has undertaken an assessment of alternative export cable routes both as part of the EIA [APP-217] and in the context of an in-principle derogation case [REP7-024] and has concluded that there is no feasible alternative export cable route that would avoid the HHW SAC. This is due to the fact that if cables were routed to the north of the HHW SAC they would encounter other designated sites (both SACs and MCZs) and if routed to the south they would encounter licensed aggregate dredging areas and further designated sites. Early opportunities to avoid marine protected sites were explored through the evidence plan process [APP-039] and due to concerns raised by members of the public and a number of statutory authorities (including Natural England and TWT about impacts on the Cromer Shoal MCZ potential landfall locations and cable routes were ruled out in order to avoid the MCZ.</p> <p>Mitigation: The Applicant has reduced and mitigated impacts as far as possible. This has been acknowledged by Natural England in their Position Statement regarding mitigation and compensation [REP9-045, para 1.24] which states, "Natural England considers that the Applicant has taken all reasonable steps to reduce the impacts of the proposed development on both of the designated features of HHW SAC and we welcome this effort".</p> <p>Pre-sweeping: It is extremely desirable for the Project to ensure that all cables are buried to an optimum depth so that they remain buried for the lifetime of the Project. This is desirable not only to reduce and remove environmental effects but also to protect the cables and maintain the flow of electricity. The best way to achieve this is through pre-sweeping and that is the Applicant's preferred approach to cable installation.</p> <p>Micrositing: Areas within the HHW SAC where export cable burial to an optimum depth will be more challenging have been identified (see Appendix 3 of the HHW SAC control documents 8.20 (REP14-31 to 34)). These do not overlap with the priority areas to be managed as Sabellaria reef which has allowed the Applicant to make the commitment to not placing cable protection within these areas</p>

Paragraph number	Paragraph text	Applicant's Response:
		<p>unless otherwise agreed with the MMO and Natural England. Furthermore, these more challenging areas will be investigated further and avoided if further work does indeed indicate that cable burial may not be possible within them. However as reported in version 2 of the HHW SAC compensation document [8.25] all bidders for export cable installation are very confident of achieving 100% cable burial within the HHW SAC and this remains the case following further route selection work. Following ISH4 the Applicant produced a clarification note on Optimising cable routeing through the HHW SAC [REP4-022] which demonstrates how it is possible to avoid all known sensitive features.</p> <ul style="list-style-type: none"> Alternative methods of protection: As mentioned above the Applicant has committed to using cable protection which can be decommissioned within the HHW SAC (except at crossing points) and therefore has ruled out rock protection. REP6-018 provides information on the types of cable protection which could be employed in order to achieve this and the Applicant has committed to further studies of the decommissioning potential of the latest products on the market as part of the HHW SAC control documents [8.20]. Other methods such as using marker buoys to identify where cables have been left unprotected were ruled out during the examination due to water depths within the HHW SAC, the mobile sediment conditions, the distance offshore and possible risks to the Health and Safety of other marine users see REP10-033 for further details. <p>In summary all possible modifications to avoid placing cable protection (rock or otherwise) within the HHW SAC have been investigated and either ruled out or secured as commitments. The commitment to not place rock protection within the HHW SAC apart from at crossings points is of particular relevance to this request and in the Applicant's opinion is sufficient, along with the other mitigation proposed, to enable the Secretary of State to rule out Adverse Effect on Integrity in this particular case.</p>
7 (ii)	<ul style="list-style-type: none"> Further information is also requested to demonstrate that all reefs can be avoided during cable installation. 	<p>Sabellaria reef is ephemeral and will move around from year to year and therefore the Applicant has committed to undertaking Annex I surveys no earlier than one year prior to construction. The results of that survey will be used to undertake the final micro-siting of the export cables to avoid Annex I reef. Doing this work any earlier could result in areas of newly formed reef being affected. However, as is recognised by the Applicant, should the results of that survey show that Sabellaria reefs are so prevalent that they span the entire</p>

Paragraph number	Paragraph text	Applicant's Response:
		<p>2km to 4.2km width of the cable corridor it would not be possible for the export cables to completely avoid reef in all locations. In this scenario, due to the extensive nature of the reef the effect of an up to 30m wide area of influence, associated with cable installation would be negligible on the reef feature and following installation the reef would rapidly recover. It is due to the uncertain nature of the extent and location of the reef at the time of construction that the Applicant can only avoid reef "where possible" at this stage.</p> <p>The Applicant has however committed to not place cable protection in priority areas to be managed as Annex I reef. REP8-014 section 1.12, REP8-017 Table 3.1 and Table 2.1 and REP6-019 provide more information on this issue. This substantial commitment was made based on a study of seabed conditions (Appendix 3 of the HHW SAC control documents 8.20) which identified that the more challenging areas for cable burial to the optimum depth do not overlap with the priority areas to be managed for Sabellaria reef (as Identified by Natural England and the JNCC).</p> <p>Therefore, the Applicant will avoid any permanent impacts on reef features by not placing cable protection in the priority areas and will avoid temporary impacts on the reef where possible (acknowledging that it would not be possible should the reefs be so extensive that they span the entire cable corridor). However due to the ephemeral nature of Sabellaria reef it is not possible for the Applicant to provide certainty of avoidance until immediately prior to construction.</p> <p>A clarification note was submitted on how the Project would undertake micro-siting to avoid all sensitive features within the HHW SAC. This note demonstrated that using current data it was clearly possible to avoid all sensitive features [REP4-022] and therefore provided sufficient evidence that an Adverse Effect on Integrity could be ruled out.</p>

2 References

Cook, A.S.C.P. (2021) Additional analysis to inform SNCB recommendations regarding collision risk modelling. BTO Research Report 739, BTO, Thetford, UK.

Cook, A.S.C.P., Humphreys, E.M., Masden E.A. & Burton N.H.K. (2014) The Avoidance Rates of Collision Between Birds and Offshore Turbines. *Scottish Marine and Freshwater Science* 5: 16.

Genesis (2020) Review of rock and other protective material use in offshore oil and gas operations in the UK Continental Shelf: Report prepared for the Department for Business, Energy & Industrial Strategy

Furness, R.W., MacArthur, D., Trinder, M. and MacArthur, K. 2013. Evidence review to support the identification of potential conservation measures for selected species of seabirds. Report to Defra.

Ross-Smith, V., Johnston, A. and Ferns, P.N. (2015) Hatching success in Lesser Black-backed Gulls *Larus fuscus* - an island case study of the effects of egg and nest site quality. *Seabird*, 28, 1-16.

Appendix 1 Wendling Beck NRP Concept Plan

6 Landowners - 1 Vision

To create a groundbreaking natural farming & wildlife recovery project in the heart of Norfolk



NATIVE MEADOW RESTORATION



HERITAGE CATTLE



WETLAND RESTORATION



HEATHLAND RESTORATION



REGENERATIVE AGRICULTURE

TREE NURSERY, TREE TRAIL & ARBORETUM

The project will merge with the visitor attractions of the Gressenhall farm and workhouse museum. A new tree trail will link a community tree nursery & climate inspired arboretum which explores the past, present and future of our woodland landscape

HEATHLAND, SCRUB & ACID GRASSLAND

Restoration of existing grassland and regeneration of heathland & scrub. The valley bottom will be altered with stream re-profiling & wetland creation. Good potential for species reintroductions.

BLACK POPLAR MEADOWS

A combination of river restoration, wetland creation and native floodplain tree planting. To support and enhance nationally significant plant communities within this area and re-wet the marshy ground adjacent to the river

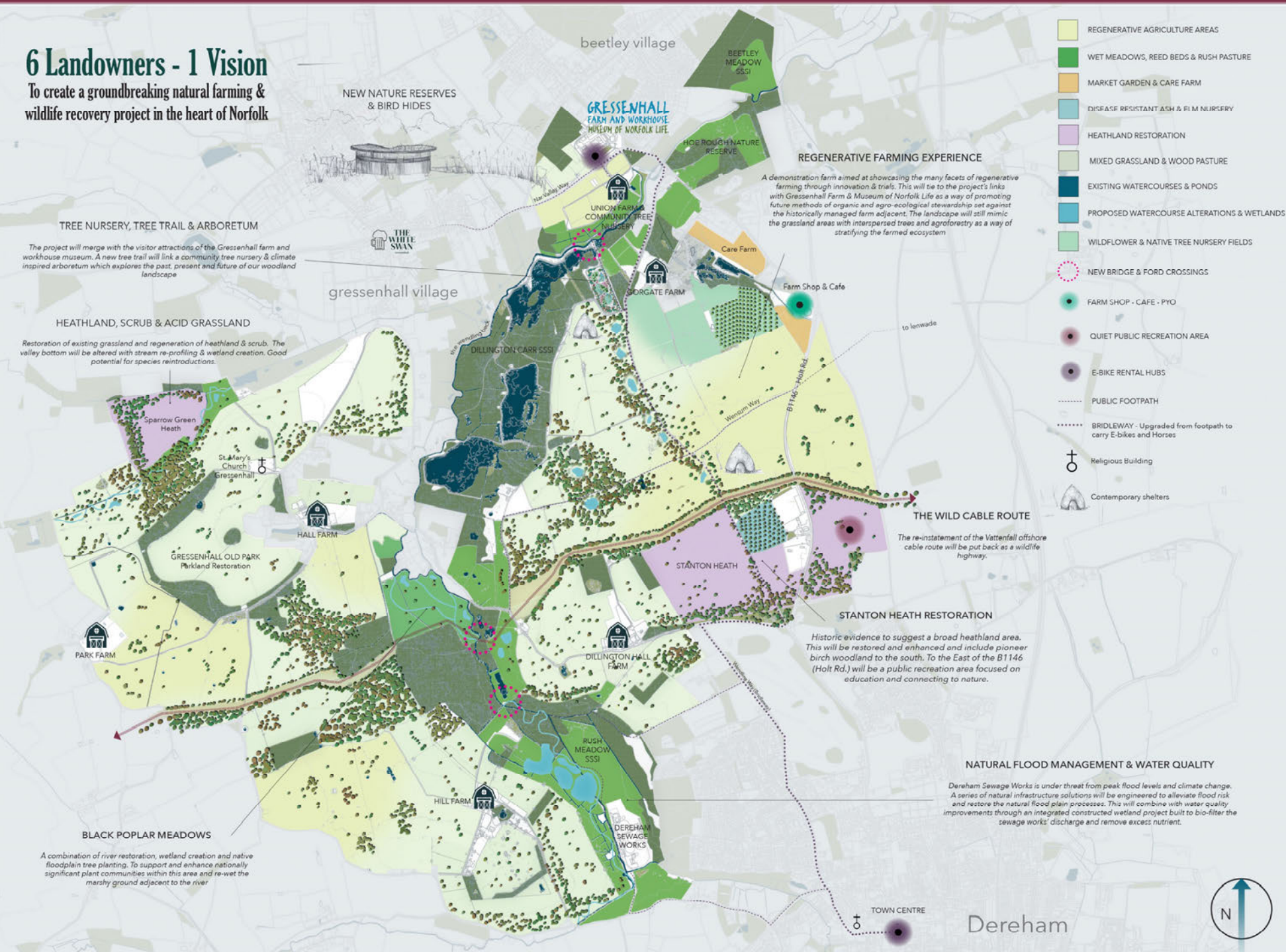
NEW NATURE RESERVES & BIRD HIDES



THE WHITE SWAN

beetley village

gressenhall village



- REGENERATIVE AGRICULTURE AREAS
- WET MEADOWS, REED BEDS & RUSH PASTURE
- MARKET GARDEN & CARE FARM
- DISEASE RESISTANT ASH & FIRM NURSERY
- HEATHLAND RESTORATION
- MIXED GRASSLAND & WOOD PASTURE
- EXISTING WATERCOURSES & PONDS
- PROPOSED WATERCOURSE ALTERATIONS & WETLANDS
- WILDFLOWER & NATIVE TREE NURSERY FIELDS
- NEW BRIDGE & FORD CROSSINGS
- FARM SHOP - CAFE - PYO
- QUIET PUBLIC RECREATION AREA
- E-BIKE RENTAL HUBS
- PUBLIC FOOTPATH
- BRIDLEWAY - Upgraded from footpath to carry E-bikes and Horses
- Religious Building
- Contemporary shelters

REGENERATIVE FARMING EXPERIENCE

A demonstration farm aimed at showcasing the many facets of regenerative farming through innovation & trials. This will tie to the project's links with Gressenhall Farm & Museum of Norfolk Life as a way of promoting future methods of organic and agro-ecological stewardship set against the historically managed farm adjacent. The landscape will still mimic the grassland areas with interspersed trees and agroforestry as a way of stratifying the farmed ecosystem

THE WILD CABLE ROUTE

The re-instatement of the Vattenfall offshore cable route will be put back as a wildlife highway.

STANTON HEATH RESTORATION

Historic evidence to suggest a broad heathland area. This will be restored and enhanced and include pioneer birch woodland to the south. To the East of the B1146 (Holt Rd.) will be a public recreation area focused on education and connecting to nature.

NATURAL FLOOD MANAGEMENT & WATER QUALITY

Dereham Sewage Works is under threat from peak flood levels and climate change. A series of natural infrastructure solutions will be engineered to alleviate flood risk and restore the natural flood plain processes. This will combine with water quality improvements through an integrated constructed wetland project built to bio-filter the sewage works' discharge and remove excess nutrient.

Dereham



Appendix 2 Avoidance Rates Note

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr Mark Trinder	08/09/2021
0.2	Reviewed	Dr Ross McGregor, Prof Bob Furness	09/09/2021
0.3	Updated	Dr Mark Trinder	09/09/2021 20/09/2021
1	Internal Approval	Dr Ross McGregor, Prof Bob Furness	20/09/2021

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EXECUTIVE SUMMARY

Estimates of collision mortality are an important aspect of seabird impact assessments for offshore wind farms, obtained using collision risk models (CRM). A critical parameter in the model is the avoidance rate, which accounts for seabird responses to turbines. Since 2015 offshore wind farm collision risk assessments have used avoidance rate values estimated in a study by the British Trust for Ornithology (BTO), commissioned by Marine Scotland (Cook et al. 2014). Natural England recently commissioned a review and update of this work (Cook 2021) which made recommendations for lower avoidance rates, which for several species equate to increased collision mortality predictions.

This report documents a review of the study data and analysis from Cook (2021) and explains how one study has been identified as a statistical outlier with a strong influence on the avoidance rate estimates. When this study, one of 415 in the analysis, is included in the analysis the avoidance rate for gulls is estimated to be 98.74%. When this study is omitted the avoidance rate increases to 99.13%. While these may not appear to be large differences, the number of collisions predicted at the lower rate (98.74%) is 1.5 times higher, which considered cumulatively across wind farms represents a large difference.

It is also notable that Cook et al. (2014) considered, but did not include, the study in question, rejecting it on the basis that some of the data collected were ‘*extremely limited*’ and that including this study ‘*may have a significant, but unquantifiable impact on the final, derived within-windfarm avoidance rates*’. No explanation for this study’s inclusion in Cook (2021) has been presented.

As a consequence, the avoidance rates recommended by Cook (2021) are not considered to be based on a robust dataset and should not form the basis for collision risk assessment. Avoidance rates calculated with the outlying study omitted are considered to be more robust for impact assessment.

1 INTRODUCTION

Natural England recently commissioned the BTO to undertake a review and analysis of collision risk avoidance rates. Natural England has made the following statements in relation to this work:

Natural England recently commissioned BTO to undertake an analysis that combines avoidance rates from various sites as presented in Cook et al. (2014), with those derived from the ORJIP study (Bowgen & Cook 2018) and any additional sites where the appropriate data are available, in order to provide avoidance rates based on data across a range of sites where possible.

The Offshore Renewables Joint Industry Programme (ORJIP) funded Bird Collision Avoidance (BCA) project represents one of the few studies of bird behaviour at an offshore windfarm, and a previous analysis, reported in Bowgen & Cook (2018), considered how the data collected could be used to parameterise avoidance rates for Collision Risk Models. However, these rates were based on the outputs from a single study and lacked the contemporary density data required in order to give more context to the observed collision rates. To support the development of SNCB advice in relation to CRMs, there was a need to consider how the data collected as part of the ORJIP BCA project should be combined with existing estimates of avoidance rates, hence the commission to BTO.

Subsequently, Cook (2021) has presented further analysis and recommended species-specific avoidance rates for a range of gull species, including those species of particular relevance to offshore wind farm collision assessments (i.e. kittiwake, herring gull, lesser black-backed gull and great black-backed gull).

In addition to species specific avoidance rates, the data were pooled to estimate combined avoidance rates for ‘small gulls’, ‘large gulls’ and ‘gulls’. The small gull category included data identified to species level (e.g. kittiwake, little gull, black-headed gull) and data identified as ‘small gull’ (e.g. ‘black-headed gull/common gull’). Similarly, the ‘large gull’ category includes species level data (herring gull, lesser black-backed gull, etc.) and data identified as large gull (e.g. ‘herring gull/lesser black-backed gull’). The ‘gull’ category includes all data for gulls; small, large and with no size description.

The avoidance rate recommendation for kittiwake in Cook (2021) is reproduced below:

Black-legged Kittiwake (and Little Gull)

All gulls rate

Rationale: Insufficient data to estimate species-specific avoidance rates. Whilst previous reports have recommended the small gulls rate, data collected at Thanet makes reference to collisions involving “unidentified gulls”, and it cannot be ruled out that these involved black-legged kittiwakes.

And for the large gull species the recommendation is:

Lesser Black-backed Gull, Herring Gull, Great Black-backed Gull and other large gull species

Large gulls rate

Rationale: *Whilst robust data are available from the onshore environment to estimate avoidance rates for Herring and Lesser Black-backed Gull, uncertainty over the identification of species involved in collisions at Thanet means it may be more appropriate to use the large gulls rate for these species.*

Similarly, a lack of robust data suggests the large gull avoidance rates should also be used for Great Black-backed Gull and other large gull species.

2 REVIEW AND RE-ANALYSIS OF COOK (2021) DATA ANALYSIS

We are indebted to the BTO for making available the data and analysis scripts used by Cook (2021). They can be downloaded here:

[\[Redacted Link\]](#)

These data and scripts have been used to investigate the estimation of basic Band model avoidance rates. Although no analysis of the extended Band avoidance rates and those for use in the stochastic collision model has been undertaken, the methods detailed below, and subsequent conclusions, are also expected to apply to avoidance rates for these models presented in Cook (2021).

The first point to make is that the data presented in Cook (2021), much of which was also used in the previous review, Cook et al. (2014), show that estimates of collision across numerous wind farms indicate strong site-specific differences; the data do not form a normal distribution of estimates around a mean. This statistical feature of the data indicates a need to consider carefully site-specific variations in risk and indicates that simply taking an average of such data does not provide an appropriate estimate of central tendency of the distribution. Statistically, the median value would be more appropriate than the arithmetic mean for these data.

As noted above, the Cook (2021) recommendation is to use the generic ‘all gull’ and ‘large gull’ rates for all gull species. Here we present analysis undertaken to investigate the influence of each of the contributory datasets on the rates obtained (i.e. a form of sensitivity analysis).

To perform this, the Cook (2021) script, which estimated the basic Band model avoidance rates, was run repeatedly, with each row of the input data (415 rows) removed in turn (i.e. on the first run just the first row was omitted, on the second run just the second row was omitted, etc. with 415 runs of the code undertaken). The ‘all gull’ avoidance rates obtained from this jackknife analysis could then be compared to determine the influence of each row on the overall results (i.e. with all the data included). If the removal of a data row increases the estimated avoidance rate then that observation’s presence is decreasing the overall estimated avoidance rate, and the converse also applies; if the avoidance rate is decreased when a row is removed then that observation is increasing the overall avoidance rate. If the output when a row is removed is close to the average then it can be concluded it is not exerting a strong influence in either direction.

Figure 1 presents the ‘all gull’ avoidance rates calculated with each row of the data omitted. It is apparent that most of the observations are clustered around the combined average and therefore are not strongly influencing the estimate. However, it can also be seen that the individual removal of a few (c. 10) of the observations changes the avoidance rate to a sufficient extent that, with them omitted (i.e. with the remaining 414 data rows), the avoidance rate lies outside the 95%

confidence intervals, either above or below. This is to be expected since these lines only bracket 95% of the observations and, by definition, there will always be data points outside the 95% confidence intervals. However, it is also apparent that there is one data row which when removed results in an ‘all gull’ avoidance rate which is a considerable distance outside the range of the other data. This data row has such a strong influence on the avoidance rate that its removal alone increases the ‘all gull’ avoidance rate calculated using the remaining 414 rows from 98.74% to 99.13%.

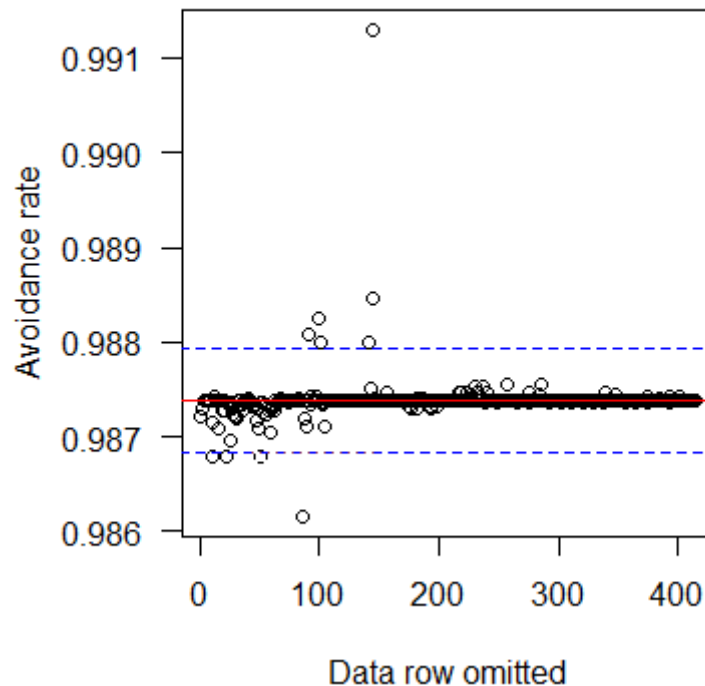


Figure 1. Estimation of the ‘all gull’ avoidance rate for the basic Band collision model with each row removed in turn from the dataset (415 rows in total). Dots are the avoidance rate obtained using the remaining 414 rows, the red line is the average avoidance rate and blue dashed lines are the upper and lower 95% confidence intervals (all obtained using 415 rows, i.e. as per Cook 2021). All analysis was conducted using the Cook (2021) R scripts.

Further investigation of this largest outlier identified it as part of a study conducted at the Kleine Pathoweg wind farm (Brugge, Belgium) and the observation which was removed was recorded as ‘herring gull or lesser black-backed gull’. The study was conducted in 2005 and 2006, although only the data from 2005 were included in Cook (2021). This study was identified and reviewed for the previous avoidance rate estimation undertaken by the BTO for Marine Scotland (Cook et al. 2014), but it was not included in that analysis (i.e. these data were not used to estimate avoidance rates). Cook et al. (2014) made the following observations in relation to the study and its suitability for inclusion in their analysis:

Fatality data have been collected on a regular basis and following a robust methodology. Corrections have been applied to these data to account for the imperfect detection of corpses due to scavenger behaviour and searcher efficiency.

The observational data that have been collected are extremely limited. Data collection has been restricted to the September to December period in a single year. It is unclear how

accurately this reflects bird movements within the windfarm over the rest of the study period. This may have a significant, but unquantifiable impact on the final, derived within-windfarm avoidance rates. In addition, it is unclear whether corrections have been applied to the observational data to account for the imperfect detection of birds.

As it has been necessary to make spatial and temporal extrapolations to estimate avoidance rates, these data have not been used when deriving representative avoidance rates.

Thus, this study, which as demonstrated in Figure 1 has a large influence on the ‘all gull’ avoidance rate and was considered unsuitable for use by Cook et al. (2014), has been included in Cook (2021). Notably, Cook et al. (2014) recognized this site could have ‘a significant, but unquantifiable impact on the final, derived within-windfarm avoidance rates’. Figure 1 provides quantification of this effect, and it is apparent that it is indeed highly significant and distinctly different from the results obtained at all other studied wind farms.

Given this study is a statistical outlier (this point is almost 5 times further outside the confidence intervals than the next most influential point) and exerts a large influence on the ‘all gull’ avoidance rate, it is clear that careful consideration should be given to whether its inclusion is appropriate. However, this revision from Cook et al. (2014) was not explained by Cook (2021). These data were considered inappropriate to include by Cook et al. (2014) and we agree with that viewpoint for the statistical reasons outlined above.

In addition, the justification for using the ‘all gull’ rate for kittiwake presented in Cook (2021) was that some of the observed gull collisions at Thanet may have been kittiwakes (i.e. the kittiwake collision rate may have been higher than that estimated if only those birds identified as kittiwakes is used). However, the fact that some of the collisions at Thanet were not identified to species level does not imply that data for known dissimilar species (in this case, large gulls: ‘herring gull or lesser black-backed gull’) should be used to estimate a kittiwake avoidance rate.

Rather, taking the above observations for Thanet into consideration, an avoidance rate for kittiwake should be estimated using (in order of preference) kittiwake data, small gull data and unidentified gull data, but importantly the last should only include records of unidentified small gulls or unidentified gulls, not ones positively identified and recorded as large gulls. In contrast, Cook (2021) estimated the ‘all gull’ avoidance rate using data for birds identified to species level, identified as small gulls, identified as large gulls and birds identified simply as gulls. However, there is no justification provided for why birds known to be large gulls are included. This ‘all gull’ rate therefore appears to be appropriate for estimating collisions only for birds which are recorded as gulls, with no further size or species categorization.

As noted above, the outlying observation from the Kleine Pathoweg wind farm was identified as relating to ‘herring gull or lesser black-backed gull’. Therefore, in addition to the fact that this site is a statistical outlier and exerts a large influence on the result, on the basis of the species involved its inclusion for estimating an avoidance rate for kittiwake must also be considered to be inappropriate.

The ‘all gull’ avoidance rate was re-estimated using the data groups of small gulls and unidentified gulls but omitting unidentified large gulls. This was first done with the inclusion of Kleine Pathoweg data (relating to an observation identified as black-headed gull), which yielded an ‘all gull’

avoidance rate for the basic Band model of 98.9% (this is the same rate currently recommended for kittiwake). However, since there is a strong case for excluding the Kleine Pathoweg data due to uncertainty about how robust the flight activity data were, the estimation was repeated without this data row. The ‘all gull’ avoidance rate without Kleine Pathoweg was 99.1%.

A jackknife analysis of the data used to estimate the ‘large gull’ avoidance rate was also undertaken. There were 155 rows of data categorized as large gulls or gulls. Using these data, Figure 2 provides the large gull avoidance rate obtained when each row was omitted in turn. As found for the ‘all gull’ analysis (Figure 1), the largest statistical outlier for the ‘large gull’ rate in Figure 2 is the Kleine Pathoweg observation identified as ‘herring gull or lesser black-backed gull’. As for the ‘all gull’ rate, inclusion of this single data row reduces the ‘large gull’ avoidance rate from 99.4% to 98.6%.

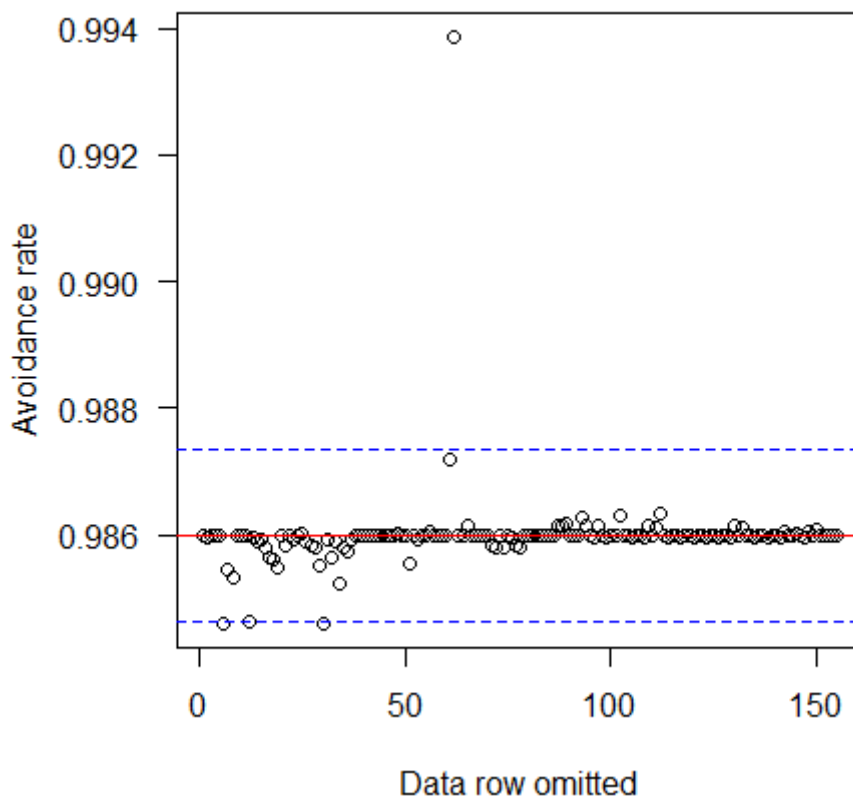


Figure 2. Estimation of the ‘large gull’ avoidance rate for the basic Band collision model with one row removed in turn from the dataset (155 rows in total). Dots are the avoidance rate obtained using the remaining 154 rows, red line is the average avoidance rate and blue dashed lines are the upper and lower 95% confidence intervals (all obtained using 155 rows, i.e. as Cook 2021). All analysis was conducted using the Cook (2021) R scripts.

3 CONCLUSIONS

The analysis presented above has demonstrated that the avoidance rates in Cook (2021) have been strongly influenced by a single study, and furthermore that this site was previously excluded (Cook et al. 2014) on the basis that the flight activity observations were made over a short duration and were therefore potentially unrepresentative for the period of collision records. While collisions could be attributed to the entire period of study (in this case 4 months), only 4 hours of flight

activity were conducted in each of those months (i.e. less than 1.5% of the daylight time available for flight activity). Indeed, the author of the study where the results were originally reported (Everaert 2014) makes precisely this point:

The results of this study should be treated with caution, because there are some methodological issues that might have affected the outcomes of the analysis. These issues mainly involve the corrections in the estimation of mortality rate, and the extrapolations due to the limited number of bird movement surveys.

The current analysis has highlighted that the views of Cook et al. (2014) on this site were justified since this site is a clear statistical outlier. It is therefore unclear why this study has been included in Cook (2021) and further consideration should be given to whether or not its inclusion is appropriate. Furthermore, the method used to derive the avoidance rate recommended for kittiwake, the 'all gull' rate, included data which would appear to be of low suitability for this species (i.e. for species known to be large gulls rather than similar species).

The re-estimated 'all gull' avoidance rate estimated without Kleine Pathoweg and with 'large gull' observations omitted, is 99.1%, which is slightly higher than the rate currently recommended for kittiwake (98.9%). This is unsurprising since the dataset is largely the same as used by Cook et al. (2014).

The re-estimated 'large gull' avoidance rate, applying the same approach, is 99.4%. Again, this is very similar to the current rate of 99.5%, for the same reasons that most of the data are common to both analyses.

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- Bowgen, K. & Cook, A. (2018) Bird Collision Avoidance: Empirical evidence and impact assessments. JNCC Report No. 614, JNCC, Peterborough, ISSN 0963-8091.
- Cook, A.S.C.P. (2021) Additional analysis to inform SNCB recommendations regarding collision risk modelling. BTO Research Report 739, BTO, Thetford, UK.
- Cook, A.S.C.P., Humphreys, E.M., Masden E.A. & Burton N.H.K. (2014) The Avoidance Rates of Collision Between Birds and Offshore Turbines. Scottish Marine and Freshwater Science 5: 16.
- Everaert, J. (2014). Collision risk and micro-avoidance rates of birds with wind turbines in Flanders, Bird Study, 61: 2, 220-230, DOI: 10.1080/00063657.2014.894492

Appendix 3 Letters of Comfort

Mr Laws
Vattenfall Wind Power Ltd
5th Floor 70
St Mary Axe
London
EC3A 8BE

19th October 2021

Dear Mr Laws

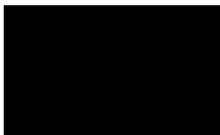
**Norfolk Vanguard and Norfolk Boreas Offshore Wind Farms
Artificial kittiwake nesting facility at The Port of Lowestoft**

We write further to our letter dated 25 September 2020 where we confirmed our in-principal agreement to assist in delivering artificial nesting sites for kittiwakes at the Port.

Since those initial discussions, we have been working closely with Vattenfall Wind Power Ltd to identify suitable locations within the Port to accommodate artificial nesting structures sufficient to compensate for the Norfolk Vanguard and Norfolk Boreas projects, should this be required by the Secretary of State. Several locations within the Port have now been identified as being potentially suitable for accommodating artificial kittiwake nesting facilities, and we are pleased to be progressing negotiations for heads of terms in respect of a lease of one of these sites and look forward to concluding those negotiations with you in due course.

We recognise the importance and urgency of delivering the Norfolk Vanguard and Norfolk Boreas projects, and we look forward to continuing working with Vattenfall to help facilitate the delivery of these projects.

Yours sincerely



Paul Litten
Head of Commercial, Wales and Short Sea Ports
Associated British Ports

Associated British Ports constituted under the Transport Act 1981. Reference No ZC000195



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- King's Lynn
- Lowestoft
- Newport
- Plymouth
- Port Talbot
- Silloth
- Southampton
- Swansea
- Teignmouth
- Troon

Cobra Mist

Mr Laws
Vattenfall Wind Power Ltd
5th
Floor 70
St Mary
Axe
London
EC3A
8BE

11 October 2021

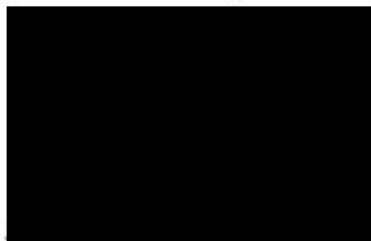
Dear Mr Laws

Norfolk Vanguard and Norfolk Boreas Offshore Wind Farms Fenced area for lesser black-backed gulls

As you know, Cobra Mist Limited owns and operate the former over-the-horizon radar and transmission facility which is situated on Orford Ness and within the Alde-Ore Estuary Special Protection Area.

We write further to our recent discussions with you in relation to the Norfolk Vanguard and Norfolk Boreas projects, which have been asked to put forward without prejudice measures to compensate for potential impacts on lesser black-backed gulls. If required by the Secretary of State, we understand that these measures are likely to be delivered through the provision of a fenced area of approximately 6 hectares or so in size, which would assist in reducing predation on lesser black-backed gulls within the Alde-Ore Estuary Special Protection Area.

Following our recent and continuing discussions with you as we work towards agreeing Heads of Terms, we are writing to confirm, that should either project be required to compensate for impacts to lesser black-backed gulls, we would in principle be willing to make available an area of our land holding which could be managed and fenced by the projects to deliver such compensation for lesser black-backed gulls.



Mr Laws
Vattenfall Wind Power Ltd
5th Floor 70
St Mary Axe
London
EC3A 8BE



Date: 15 October 2021
Our Ref: w:/letters/Laws

Dear Mr Laws

**Norfolk Boreas and Norfolk Vanguard Offshore Wind Farms
Artificial kittiwake nesting facility**

I am writing on behalf of Great Yarmouth Borough Council (at officer level) in relation to the Norfolk Boreas and Norfolk Vanguard Offshore wind farm developments which are supported in terms of employment generation and supply chain opportunities in a key sector for both the borough and the wider area. Alongside partners, we are also committed to developing an offshore energy Operations and Maintenance base in the South Denes peninsular of Great Yarmouth, close to the deep water outer harbour which forms part of our wider suite of Town Deal projects.

From our recent discussions with you, on behalf of Vattenfall Wind Power Ltd, we are aware that the Secretary of State for Business, Energy and Industrial Strategy has asked the applicants of the Norfolk Vanguard and Norfolk Boreas projects, to propose without prejudice compensation measures for potential impacts on kittiwakes.

We understand that the provision of artificial nesting sites is being progressed in the event that compensation measures are required by the Secretary of State, and that you are continuing to investigate the availability of sites where the artificial nesting sites could be located, including expansion of the existing colony in Lowestoft and exploration of extant offshore structures.

We are writing to confirm that should the projects or an individual project be required to provide artificial nesting sites as compensatory measures for kittiwakes, we are willing to work with you in exploring options to deliver these measures in suitable areas within the Borough Council's land holdings.

Yours sincerely,



David Glason
Director of Planning & Growth



Mr Laws
Vattenfall Wind Power Ltd
5th Floor 70
St Mary Axe
London
EC3A 8BE

13th October 2021

Dear Mr Laws

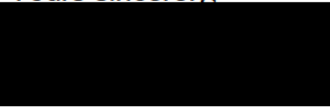
**Norfolk Boreas and Norfolk Vanguard Offshore Wind Farms
Artificial kittiwake nesting facility**

We understand, from our recent discussions with you, on behalf of Vattenfall Wind Power Ltd, that the applicants of the Norfolk Vanguard and Norfolk Boreas projects have been requested by the Secretary of State for Business, Energy and Industrial Strategy, to provide without prejudice compensation measures for potential impacts on kittiwakes.

Our understanding is that the provision of artificial nesting sites is being progressed in the event that compensation measures are required by the Secretary of State, and that you are continuing to explore the availability of sites where the artificial nesting sites could be located.

We are writing to confirm that, in accordance with our recent and continuing discussions with you, should either project be required to provide artificial nesting sites as compensatory measures for kittiwakes, we would be willing, in principal, to work with you in delivering such measures.

Yours sincerely,


Richard Goffin
Port Director Great Yarmouth & London Medway
Peel Ports Group Limited

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NR30 3GY