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NORFOLK BOREAS OFFSHORE WIND FARM

Planning Inspectorate Reference: EN010087

Deadline 9

**Natural England's Updated Offshore Ornithology Advice**

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## **1 Introduction**

Within this document please find Natural England's comments on the following documents:

- Norfolk Boreas Offshore Ornithology Assessment Update Project Alone Collision Risk Modelling version 2 [REP7-029/030]
- Norfolk Boreas Offshore Ornithology Update: Response to Natural England's submission EV9-003 and further comments to REP4-040 [REP7-031]
- Applicant's Response to Natural England's REP7-045 and REP7-046 [REP8-016]
- Norfolk Boreas Offshore Ornithology Assessment Update Cumulative and In-combination Collision Risk Modelling [REP8-025/026],
- Norfolk Boreas Combined Response to Natural England's Ornithology Submissions [REP8-027]

## **2 Project Alone Collision Risk Modelling [REP7-029/030]**

### **2.1 General Comments**

We welcome the inclusion by the Applicant in REP7-029/030 of the additional collision risk modelling (CRM) input parameters as suggested by Natural England in EV9-003 (i.e. monthly seabird densities and seabird biometrics).

## **3 Response to Natural England's Submission EV9-003 and Further Comments to REP4-040 [REP7-031]**

### **3.1 Increases in Draught Height**

We welcome the clarification provided by the Applicant in REP7-031 regarding the reference points used for sea level datum. It may well be the case that using highest astronomical tide (HAT), mean sea level (MSL), mean high water springs (MHWS) etc. as the reference point does not make a difference to the predicted collision figures, provided the datum used and the height difference between this and MSL are stated in order to ensure the correct tidal offset is applied in CRM, and that all heights in the calculations are based on MSL. However, we note that it can cause considerable confusion, and potentially causes a problem when others need to use the information at a later date and are unable to work out whether a measurement relates to HAT, MSL, MHWS etc. It would be very helpful if the industry could agree a standardised method for use in all projects.

We note that for the Norfolk Boreas CRM all turbine sea level references points have been based on MHWS and the tidal offset based on the difference is the difference between MSL and MHWS.

We also note that the Band guidance does say that hub height is measured relative to HAT. Band (2012) states:

*'HUB HEIGHT: This is the height in metres of the rotor hub, i.e. the axis around which it rotates, above the sea surface taken as the Highest Astronomical Tide. In conjunction with the rotor radius and tidal offset, this determines the flight altitudes at risk. In the basic model this parameter is not used in the calculation but it is desirable to state it, as the proportion of birds flying at risk height is strongly dependent upon it. It is however a key parameter in the extended model.'*

*TIDAL OFFSET: This is the difference in metres between HAT (from which hub height is measured) and mean sea level  $Z_0$ . The difference is typically 2-3m but may be up to 5m or more in estuarine locations*

*Tidal offset = Highest Astronomical Tide (HAT) – Mean Sea Level ( $Z_0$ )'*

So while this may not affect the 'basic' Band option outputs (i.e. Options 1 or 2), Natural England are uncertain as to why the Applicant cannot present their data according to these conventions.

We also note that whilst the point of reference to which the draught height of turbines for the revised Norfolk Boreas worst case scenario (WCS) and also for Norfolk Vanguard in the additional mitigation recently submitted in response to the SoS request for additional mitigation<sup>1</sup> is measured MHWS, we note that Hornsea 3 has considered an increase to the lower rotor tip height from 33.17m to 40m above MSL. Therefore, the differences in reference points used between projects makes it very difficult to compare draught heights and associated increases committed to across projects. Again a standardised approach across the industry would readily address this.

### **3.2 DCO Wording**

We welcome the information provided by the Applicant on this issue in REP7-031. We are mostly content that all the relevant parameters for the revised WCS are secured in the updated dDCO conditions and that so long as all of these parameters are observed; collision risk will not be anticipated to exceed the worst case modelled in the collision risk

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<sup>1</sup> MacArthur Green (2020) Norfolk Vanguard Offshore Wind Farm: Additional Mitigation Appendix 1 – Updated Collision Risk Modelling. Available from: <https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/projects/EN010079/EN010079-004215-ExA;%20Mit;%2011.D10.2.App1%20Additional%20Mitigation%20Appendix%201%20Updated%20Collision%20Risk%20Modelling.pdf>

assessment. However, please see our comments in response to DCO documents at D9 [NE.NB.D9.02.DCO] regarding the inclusion of minimum turbine size.

### **3.3 Kittiwake Collisions apportioned to the FFC SPA for the 10MW turbine**

We agree with the Applicant that as the collision prediction in question (i.e. that for the 10MW turbine) is no longer relevant, as the 10MW turbine has been removed from the project envelope and the revised WCS, and hence collision prediction is now based on the 14.7MW turbine. Natural England has previously noted in EV9-003 our agreement with the Applicant's predicted collision figure of 14 (range: 4-28) kittiwakes per annum from the FFC SPA for the revised WCS of 14.7MW turbines for Norfolk Boreas alone.

### **3.4 Comparison of Population Viability Analysis (PVA) outputs from 500, 1,000 and 5,000 simulations**

We welcome that the Applicant has in REP7-031 re-run the PVAs using the updated (version 2) Natural England 'Seabird PVA tool'<sup>2</sup> for those models where only 500 simulations had been previously undertaken, i.e. for kittiwake at EIA cumulative scale (Biologically defined Minimum Population, BDMPS and biogeographic population scale) and for guillemot at the FFC SPA scale. We welcome that these models have been re-run for 500, 1,000 and 5,000 simulations and that the metrics of counterfactual of population size and counterfactual of growth rate for each have been presented.

We note that the results of the comparisons of these model outputs undertaken by the Applicant indicates very minimal differences in the counterfactuals for the models when run with 500, 1,000 and 5,000 simulations. However, we note that whilst this is the case for these particular species and populations (i.e. kittiwake BDMPS and biogeographic population scales and guillemot at the FFC SPA), it may not always be the case for any model for any species/population. We again note that the PVA Tool itself has a warning if you try to run the models with less than 1,000 simulations. The PVA Tool package guidance states: *'it is not recommended to use small values of **sim.n** because PVAs based on small numbers of simulations are likely to be unreliable (using a value of less than 1000 will generate a warning message, but in practice the minimum number of simulations may need to be substantially higher than this in order to achieve reliable results).'*'

We would therefore recommend that for any PVA models that are constructed in the future, 5,000 simulations should be considered best practice. Natural England has considered the counterfactuals using 5,000 simulations presented by the Applicant in REP7-031 and note that using these figures does not alter the conclusions reached by

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<sup>2</sup> A Population Viability Analysis Modelling Tool for Seabird Species, available from: PVA <http://ec2-54-229-75-12.eu-west-1.compute.amazonaws.com/shiny/seabirds/PVATool/R/>

Natural England for cumulative (EIA scale) collisions for kittiwakes and in-combination displacement for guillemot of the FFC SPA set out in REP4-040 and REP7-047.

## **4 Response to Natural England's REP7-045 and REP7-046 [REP8-016]**

### **4.1 General**

Natural England feels they have responded to all the point raised within REP8-016 within response to Examining Authority's Questions or in response to other submissions within this document so in order to avoid repetition have not included them here.

### **4.2 Precaution in assessments**

Natural England notes that we have agreed that the Applicant's assessment should focus on Option 2 figures (i.e. using generic flight height distribution data from Johnston et al. 2014) due to the aerial survey contractors concerns with the reliability of the site-specific flight height data collected. However, the site-specific data (although potentially dubious) does suggest that birds on the site fly higher than the generic data would suggest and this was also the case at Thanet offshore wind farm. We note that the generic Johnston et al. 2014 dataset is largely based on boat-based survey data, where it is very difficult to accurately estimate bird flight heights at sea, particularly when there are no structures to use as reference (e.g. before construction of turbines at a site). Therefore, whilst the Applicant focuses on all the elements of the assessments which may be precautionary, the lack of accurate site-specific flight height data is one of the areas where assessments may be lacking precaution.

As such, we are not requesting further discussion on the differences between the Option 1 and 2 outputs with the Applicant, but this lack of site-specific data and the need to collect data on accurate collisions are areas we suggest should be considered in any monitoring proposals should the Norfolk Boreas site be consented.

### **4.3 Flamborough and Filey Coast SPA – Kittiwake counts**

Natural England notes that the target for the 'breeding population: abundance' attribute for this species is to restore the population to 83,700 breeding pairs at this site and therefore the conservation objective for the SPA should be to restore the kittiwake population. It is this target that should be considered in the assessment when judging the significance of predicted impacts against the conservation objectives for this feature. For more information see Supplementary Advice on Conservation Objectives available from: <https://designatedsites.naturalengland.org.uk/Marine/SupAdvice.aspx?SiteCode=UK9006101&SiteName=flamb&SiteNameDisplay=Flamborough+and+Filey+Coast+SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAAarea=&NumMarineSeasonality=4> . Please

note that the draft conservation advice package has undergone a public 'invitation to comment' consultation and was finalised in March 2020.

## **5 Cumulative and In-combination Collision Risk Modelling [REP8-025/026]**

### **5.1 General Comments**

We welcome the Applicants Offshore Ornithology Assessment Update Cumulative and In-combination Collision Risk Modelling [REP8-025/026], to address the issues raised by Natural England in REP7-047.

The updates in REP8-025/026 have only altered the numbers for gannet at the Flamborough and Filey Coast (FFC) Special Protection Area (SPA) and for kittiwake at both the EIA scale and for the FFC SPA. Therefore, for all other species (gannet, lesser black-backed gull, herring gull, great black-backed gull and little gull) for cumulative EIA collisions and for in-combination collisions (lesser black-backed gulls at the Alde-Ore Estuary SPA and for little gulls at the Greater Wash SPA), our advice remains that set out in REP7-047 and REP4-040.

With regard to the issues/concerns regarding the increases to draught height and reference points used for turbine hub height and tidal offset, and those regarding the amended wording of the draft DCO to secure the additional mitigation comments made by Natural England in REP7-047 and EV9-003, please see our updated comments (This document chapter 3) to the information provided by the Applicant in REP7-031.

### **5.2 Updated gannet FFC SPA in-combination figures**

We welcome that in REP8-025/026 the Applicant has corrected the errors identified by Natural England in REP7-047 with the apportioned spring and autumn figures for gannets from the FFC SPA for both Norfolk Vanguard and Norfolk Boreas. We agree with the updated figures and agree that this makes no material difference to the assessment of impacts on the SPA and our advice remains that set out in REP7-047 and REP4-040, namely:

**An adverse effect on integrity (AEoI) of the gannet feature of the FFC SPA can be ruled out for in-combination collision impacts if Hornsea 3 and Hornsea 4 are excluded from the in-combination totals.**

**However, due to Natural England's significant concerns regarding the incomplete baseline surveys for the Hornsea 3 project, and the associated level of uncertainty as regards the potential impacts of that project, together with the inevitable uncertainty associated with the figures for Hornsea 4 from the PEIR which are**



**subject to change, Natural England therefore is not in a position to advise that an AEoI can be ruled out for the gannet feature of the FFC SPA for in-combination collision impacts when the Hornsea 3 and Hornsea 4 projects are included in the in-combination totals.**

### **5.3 Updated kittiwake cumulative and FFC SPA in-combination collision figures**

We also welcome that in REP8-025/26 the Applicant has corrected the cumulative and in-combination totals for kittiwake for all projects excluding Hornsea 3. We agree with the updated figures and agree that this has not affected the totals for all projects and for all projects excluding both Hornsea 3 and Hornsea 4 and that these remain unchanged. Therefore, our advice remains that set out in REP7-047 and REP4-040, namely:

- EIA scale cumulative: we are unable to rule out a significant adverse impact on kittiwake from cumulative collision mortality at an EIA scale irrespective of whether the Hornsea 3 and Hornsea 4 projects are included in the cumulative totals or not.
- HRA FFC SPA in-combination: as this feature has a restore conservation objective, and because there are indications that the predicted level of mortality would mean the population could decline from current levels should it currently be stable, it is considered that there is an AEoI of the kittiwake feature of the FFC SPA for collision impacts from in-combination with other plans and projects, both including and excluding Hornsea 3 and Hornsea 4.

## **6 Combined Response to Natural England's Ornithology Submissions [REP8-027]**

### **6.1 Comments on Applicant's Responses to REP7-047**

### **6.2 Comments on responses on updated cumulative/in-combination collision figures presented by the Applicant**

As noted in our Deadline 9 response to REP8-025/026, we welcome the Applicant's updates to the gannet FFC SPA in-combination collision totals and to the kittiwake cumulative and in-combination collision totals to account for the errors noted by Natural England in REP7-047. We agree with these updated figures and agree that these updates make no material difference to the assessment of impacts and conclusions set out in REP4-040 and REP7-047.

Please see our Deadline 9 response to REP7-031 regarding the Applicant's response to our comments on the sea level reference point used in relation to turbine draught height (i.e. which sea level datum is used) and the wording to be used in the DCO to ensure the assessed project design is secured.

With regard to headroom, Natural England's position on headroom has been set out previously in REP6-049 and REP7-048. In summary, we acknowledge the work that the Norfolk Boreas Applicant and their consultants have done to consider potential headroom in the in-combination/cumulative collision risk figures by assessing the 'as built' rather than the WCS. Natural England recognises that headroom is a significant issue, however it is a highly complex one, and it is important to note that there is not yet an agreed way forward at present. The Applicant's approach has also not been subjected to judicial scrutiny. There are issues/uncertainties associated with the Applicant's proposed approach and issues with the approach developed by MacArthur Green for The Crown Estate (TCE), and hence Natural England's advice is that it is not used. Until these issues are addressed and an industry wide approach is agreed we recommend that the default 'standard' approach is appropriate. We do not disagree that there is likely to be some headroom; however the exact extent of any potential headroom is not agreed.

Proceeding on a project-by-project basis raises significant risks of inconsistency of approach across applications. Therefore, we consider that this issue needs to be addressed strategically on behalf of the whole sector, including developing consensus on an approach. However we do recognise that this is not possible in the Norfolk Boreas examination timetable.

We also note that Natural England has raised in REP6-049 queries with respect to the revised collision predictions the Applicant has calculated for the Hornsea Project One 'as built' layout, namely i) uncertainties over whether the correct density data has been used and ii) concerns regarding the use of only Option 1 figures and Natural England's long-standing concerns highlighted regarding site-specific flight heights used in the collision risk modelling (CRM) of Hornsea projects. We consider that whilst these matters are outstanding it would not be safe to assume that Hornsea Project One provides the amount of headroom calculated.

## **6.3 Comments on responses on summary of Natural England advice**

### **6.3.1 Environmental Impact Assessment (EIA) cumulative collisions**

As noted in our advice in REP7-047, the cumulative collision totals excluding and including Hornsea 3 and 4 for gannet, kittiwake, lesser black-backed gull (LBBG) and great black-backed gull (GBBG) exceed 1% of baseline mortality of the largest Biologically Defined Minimum Population Scale (BDMPS), and those for gannet and GBBG (excluding and including Hornsea 3 and 4) exceed 1% of baseline mortality of the biogeographic populations. These figures therefore were given further consideration by the Applicant using PVA. Natural England has considered the counterfactual of population size and counterfactual of growth rate metrics from these PVAs together with an assessment of the conservation status and population trends for these species in order to formulate our advice. Following this we advised that there were significant adverse effects for gannet, kittiwake and GBBG from cumulative collision mortality at an EIA scale irrespective of whether the Hornsea 3 and Hornsea 4 projects are included in the cumulative totals or not.

Due to the uncertainty regarding the Hornsea 3 and Hornsea 4 figures, we were not in a position to advise that significant impact can be ruled out for LBBG or herring gull for cumulative collision impacts when the Hornsea 3 and Hornsea 4 projects are included in the cumulative totals.

Natural England notes that we also reached a conclusion of a significant adverse impact at the EIA scale for GBBG cumulative collisions at East Anglia 3 and that since then further projects and associated impacts have been added to the total predicted cumulative collisions. We also note that at the end of the Norfolk Vanguard examination in June 2019 Natural England also concluded that there was a significant adverse impact at the EIA scale gannet and kittiwake cumulative collision impacts. At that time no figures were included for Boreas (or East Anglia One North and East Anglia 2) in the Norfolk Vanguard cumulative assessments, so the totals now presented have increased for compared to those at the end of the Norfolk Vanguard examination.

### **6.3.2 Habitats Regulation Assessment (HRA) in-combination collisions**

As noted in our advice in REP7-047, the in-combination collision totals irrespective of whether Hornsea 3 and 4 were included or excluded for kittiwake from the FFC SPA and LBBG from the Alde-Ore Estuary SPA (no birds apportioned to the Alde-Ore from Hornsea 3 and 4) exceed 1% of baseline mortality of these colonies. These figures therefore were given further consideration by the Applicant using PVA. To formulate our advice Natural England has considered the counterfactual of population size and counterfactual of growth rate metrics from these PVAs, together with an assessment of the conservation objectives and plausible future growth rates for these colony populations. Following this we advised that we were unable to rule out an adverse effect on integrity (AEoI) for these features of these sites.

Natural England notes that we have advised from the Hornsea 2 and East Anglia 3 examinations onwards that it was not possible to rule out an AEoI on the FFC SPA from operational and consented projects due to the level of annual in-combination collision mortality predicted for kittiwake, repeating this advice at the Norfolk Vanguard and Thanet Extension Examinations.

The Applicant notes that the Norfolk Boreas contribution (based on the revised WCS collision predictions) to the in-combination collision totals for LBBGs from the Alde-Ore Estuary SPA is similar to the East Anglia 3 consented contribution and that the in-combination total reached at East Anglia 3 was slightly higher than that reached for Norfolk Boreas. It should be noted that the assessment methodologies used to quantify and understand potential impacts have changed considerably since the East Anglia 3 consent, particularly with respect to interpretation of PVA model outputs using the metrics of counterfactual of population size and counterfactual of growth rate. Subsequently there has also been the publication of Natural England's formal Conservation Advice package for the Alde-Ore Estuary SPA and associated conservation objective to restore the SPA's LBBG population, which are available from:

<https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK9009112&HasCA=1&NumMarineSeasonality=8&SiteNameDisplay=Alde-Ore%20Estuary%20SPA>

It should be noted that the Norfolk Boreas alone figures, and therefore their contribution to the in-combination collision totals, are estimations which are underpinned by a number of assumptions, several of which have considerable uncertainty associated with them.

#### **6.4 Comments on responses on Appendix 1 of REP7-047: EIA cumulative collisions**

Please see our Deadline 9 response to REP7-031 (above) regarding response to the Applicant's comparison of PVA metrics for models run for 500, 1,000 and 5,000 simulations for kittiwake EIA scale (Biologically Defined Minimum Population Scale (BDMPS) and biogeographic population). Natural England has considered the counterfactuals using 5,000 simulations presented by the Applicant in REP7-031 and note that using these figures does not alter the conclusions reached by Natural England for cumulative (EIA scale) collisions for kittiwakes set out in REP4-040 and REP7-047.

We note that no comparisons or updates have been undertaken for the outputs for the LBBG and GBBG EIA scale PVAs, which were undertaken by the Applicant in REP2-035 using 1,000 simulations. We note that in our Deadline 9 response to REP7-031(above) we would recommend that 5,000 simulations should be considered best practice for PVAs. However, we have continued to use the outputs of these models in our advice in REP7-047, as they currently represent the best available evidence on which to base an assessment.

#### **6.5 Comments on responses on Appendix 2 of REP7-047: HRA in-combination collisions**

Please see our Deadline 9 response to REP7-031 (above) regarding response to the Applicant's comparison of PVA metrics for models run for 500, 1,000 and 5,000 simulations for guillemot at the FFC SPA. Natural England has considered the counterfactuals using 5,000 simulations presented by the Applicant in REP7-031 and note that using these figures does not alter the conclusions reached by Natural England for in-combination displacement of guillemot of the FFC SPA set out in REP4-040.

We note that the PVA updates from the Applicant in REP7-031 only relate to the EIA scale PVAs and the guillemot FFC SPA PVA run by the Applicant using the Seabird PVA tool, and that no updates have been undertaken by the Applicant to the FFC SPA PVAs undertaken during the Hornsea 3 examination for gannet, kittiwake and razorbill, or the Alde-Ore Estuary SPA PVA undertaken during the Vanguard examination for LBBG. Therefore, our previous concerns/queries regarding these PVAs as outlined in our RRs [RR-099] and in REP4-040 and REP7-047 still remain. However whilst still holding these reservations we have continued to use the outputs of these models in our advice in REP7-

047, as they currently represent the best available evidence on which to base an assessment.

## **6.6 Comments on Applicant's Responses to REP7-048**

As noted in our Deadline 9 response to the Applicant's updated CRM for Norfolk Boreas alone presented in REP7-029/030 (above), we welcome the inclusion by the Applicant in REP7-029/030 of the additional collision risk modelling (CRM) input parameters as suggested by Natural England in EV9-003 (i.e. monthly seabird densities and seabird biometrics).

With regard to increases to draught height and the information supplied by the Applicant in REP7-031, please see our responses regarding this set out in our Deadline 9 response to REP7-031. We note that it would be very helpful if the industry could agree a standardised method/point of reference for use in all projects.

We welcome that the Applicant has presented the range of kittiwake collisions predicted for Norfolk Boreas alone for EIA and HRA scale using a range of kittiwake flight speeds following our recommendations regarding kittiwake flight speeds in REP7-048. We note that consideration of this range does not alter our conclusions for kittiwake collision impacts from Norfolk Boreas alone and cumulatively or in-combination as set out in REP4-040 and REP7-047.