Response to the Offshore Ornithological Assessment Updates (Project Alone and Project Cumulative & In-combination Collision Risk Modelling) and Report on the Implications for Ecological Sites

for the

Royal Society for the Protection of Birds

Submitted for Deadline 9

29th April 2020

Planning Act 2008 (as amended)

In the matter of:

Application by Norfolk Boreas Limited for an Order Granting Development Consent for the Norfolk Boreas Offshore Wind Farm

Planning Inspectorate Ref: EN010087

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Contents

1. Introduction

1.1 The RSPB has reviewed its position in light of the Applicant's updated impact assessments: Offshore Ornithology Assessment Update, Project Alone Collision Risk Modelling (REP5-059, REP7-029, REP7-030) and Offshore Ornithology Assessment Update, Project Cumulative and In-Combination Collision Risk Modelling (REP6-024, REP8-025, REP8-026). In this submission, we summarise our updated position following our review of this updated information (Section 2), and provide further discussion of our key outstanding concerns regarding the Applicant's approach to the assessment of impacts on features of the Flamborough to Filey Coast and Alde-Ore Estuary Special Protection Areas (SPAs) affected by the Boreas DCO application (Sections 3 and 4). We also include comments on the Report on the Implications for European Sites (Section 5).

2. Summary of the RSPB's position regarding adverse effects

2.1 The RSPB welcomes the revisions to the turbine specification submitted at Deadline 5 and the subsequent re-calculations of mortality predictions arising from collisions through the project alone (Deadline 5) and in-combination (Deadline 6). Although the Applicant does not present these re-calculations in the context of Population Viability Analysis (PVA), using the models previously submitted the RSPB has investigated the Counterfactuals of Population Size (CPS) for these revised estimates of mortality (Tables 1 & 2 in Section 4 below). CPS is an output metric of PVA that shows the percentage difference between projected population sizes with and without the in-combination developments. It is the RSPB's preferred metric for reasons described below. These show that for in-combination collisions:

- The Flamborough and Filey Coast SPA population of gannet will be greater than **48.5% lower** after 30 years than it would have been in the absence of mortality arising from the in-combination developments including Hornsea Projects 3 and 4, or **46.7% lower** excluding Hornsea projects, using the RSPB's preferred breeding season avoidance rate, or **37.1%** and **32.7% lower**, respectively, using the Applicant's preferred avoidance rate.
- The Flamborough and Filey Coast SPA population of kittiwake will be **20.5% lower** after 30 years than it would have been in the absence of mortality arising from the in-combination developments including Hornsea Projects 3 and 4, or **10.8% lower** excluding Hornsea projects.
- The Alde-Ore Estuary population of lesser black-backed gull will be **33.1% lower** after 30 years than it would have been in the absence of mortality arising from the in-combination developments.

2.2 Having reviewed these values our conclusions as to adverse effects on the integrity of the Flamborough and Filey Coast and the Alde-Ore Estuary SPAs are as follows.

2.3 We conclude that adverse effects on site integrity of the Flamborough and Filey Coast SPA cannot be ruled out, with reference to the following SPA features:

- Kittiwake, in-combination, regardless of whether Hornsea Project 3 and 4 are included or omitted;
- Gannet, in-combination, regardless of whether Hornsea Project 3 and 4 are included or omitted;
- Seabird assemblage, in-combination, regardless of whether Hornsea Project 3 and 4 are included or omitted, based on combined impacts of kittiwake, gannet, guillemot and razorbill.

2.4 We also conclude that adverse effects on site integrity of the Alde-Ore Estuary SPA cannot be ruled out, with reference to the following SPA feature:

- Lesser black-backed gull, in-combination.

3. Kittiwake flight speed

3.1 The Applicant has produced a note on flight speeds for kittiwake (REP5-060). The RSPB welcomes the attempt to use evidence-based rates to parameterise the Collision Risk Models (CRMs), however there are severe limitations to the approach taken by the Applicant. Like all the biological parameters of the Band model there is not a single fixed correct value, rather a distribution of possible values, and there may be considerable uncertainty as to the nature of that distribution and its central tendency. In the case of flight speed, there is considerable variability due to behavioural state (for example, Fijn & Gyimesi, (2018[1]) demonstrated that foraging birds are likely to fly slower than commuting birds) and environmental conditions (for example, as intuitively makes sense, birds flying upwind are likely to fly slower than birds flying downwind[2], (Elliot *et al.*, 2014)). Furthermore, behavioural state will interact with environmental conditions, for example, Lane *et al.*, (2019)[3] found that gannets spent more time actively foraging in stronger winds. As bird behaviour and wind conditions vary spatially the best approach to the use of flight speed in collision risk models would therefore be to collect site-specific data on speed in order to capture the behaviours and environmental conditions relevant to that site. In the absence of such data, the model has typically, and quite correctly, been used with precautionary values for flight speed. This is entirely appropriate, as the precautionary principle means that where there is uncertainty, including that arising from variability in input parameters, conservative values must be used (Kreibel et al., 2001[4]).

3.2 As part of the Offshore Renewables Joint Industry Partnership (ORJIP) Bird Collision Avoidance study, the flight speed of a small number of species of seabird were collected (Skov *et al.*, 2018[5]). These speeds were reviewed in the context of the Band CRM by Bowgen and Cook (2018)[6]. As well as highlighting the importance of using site-specific flight parameters, they suggested different measures of flight speed for the Band model, "true speed" and "straight-line speed", and recommended the selective use of these at different stages of the Band model procedure. A more straightforward, and accurate, approach is the use of "instantaneous flight speed", measured by

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[1] Fijn, R. C., & Gyimesi, A. (2018). Behaviour related flight speeds of Sandwich Terns and their implications for wind farm collision rate modelling and impact assessment. *Environmental Impact Assessment Review*, *71*, 12-16.

[2] Elliott, K.H., Chivers, L.S., Bessey, L., Gaston, A.J., Hatch, S.A., Kato, A., Osborne, O., Ropert-Coudert, Y., Speakman, J.R. and Hare, J.F., 2014. Windscapes shape seabird instantaneous energy costs but adult behavior buffers impact on offspring. *Movement Ecology*, *2*(1), p.17.

[3] Lane, J. V., Spracklen, D. V., & Hamer, K. C. (2019). Effects of windscape on three-dimensional foraging behaviour in a wide-ranging marine predator, the northern gannet. *Marine Ecology Progress Series*, *628*, 183-193.

[4] Kriebel, David, Joel Tickner, Paul Epstein, John Lemons, Richard Levins, Edward L. Loechler, Margaret Quinn, Ruthann Rudel, Ted Schettler, and Michael Stoto. "The precautionary principle in environmental science." *Environmental health perspectives* 109, no. 9 (2001): 871-876.

[5] Skov, H., Heinänen, S., Norman, T., Ward, R., & Méndez, S. (2018). ORJIP Bird avoidance behaviour and collision impact monitoring at offshore wind farms.

[6] Bowgen, K. & Cook, A. 2018. Bird Collision Avoidance: Empirical evidence and impact assessments. JNCC Report No. 614, JNCC, Peterborough, ISSN 0963-8091

GPS, as demonstrated by Fijn & Gyimesi, (2018[1]) using GPS tag data. This study showed significant differences in flight speeds, and subsequent collision mortality predictions, in relation to behaviour and again highlighted the importance of site-specific behaviour.

3.3 In presenting their preferred flight speeds for kittiwake, the Applicant dismisses flight speeds derived from tagging studies by claiming that the tags used were not "streamlined" and that they caused behavioural anomalies by being too heavy in comparison with the bird's body mass. The first of these points is factually incorrect, the second is a reiteration of an unsubstantiated claim made by the Applicant in earlier Application documents and in the Norfolk Vanguard Application (Vattenfall 2018[7]).

3.4 With regard to streamlining, the tags were not deployed in manufacturers housing in which they were supplied, but rather the internal mechanism of the tag was removed from the housing and rehoused in tubing. This tubing was heat shrunk at each end, to **produce a very streamlined tag**, tapering front and back. It is unclear why the Applicant made this assertion without first checking whether it was accurate.

3.5 With regard to tag weight, a review of the unsubstantiated allegations regarding tag weight has been made in our previous submissions (REP2-096). Notwithstanding that review, the RSPB has carried out an extensive investigation of effects arising from the weight of tags on seabird behaviour, the results of which were inconclusive, as there were multiple factors that could have led to confounding results (Cleasby *et al*., 2019[8]). This is because the projects investigated were not designed specifically to investigate tag effects and carefully considered experimental design is required to provide a more unequivocal analysis of tag effects. These results have been presented to the Applicant, and although they have not responded to that presentation, they continue to make allegations in non-peer reviewed reports regarding the veracity of tagging studies. It should be noted that these allegations have not affected the acceptance of results from these tagging studies being accepted in the recent peer-reviewed literature (e.g. Cleasby *et al.*, 2020[9]), included in the recent Crown Estate funded review of foraging ranges (Woodward *et al.*, 2019[10]) which was overseen by a panel of experts, and indeed the Applicant's own experts have been co-authors of work that utilises these tagging studies (Searle *et al.*, 2018[11]).

3.6 The Applicant's approach to setting a value for wind speed to input into the Band model is to simply take an average of the published ground speed values set out in Table 1.1 of their review (REP5-060), disregarding any reference to behaviour or environmental conditions. There is considerable variation in these values, ranging from 7.26 to 15.9 m/sec, and within the studies there is variability of between 4 and 17 m/sec. Much of this variability is likely to be due to behaviour and environmental conditions and so to be site-specific. As such, to simply take a mean

[7] Vattenfall 2018, Information for the Habitats Regulations Assessment for Norfolk Vanguard, Document Reference 5.3

[8] Cleasby, I.R., McCluskie, A, Owen, E., Wilson, L., W Wischnewski, S., Wright, L.& Bolton, M (2019) Assessing the potential effects of GPS tagging on seabird behaviour in black-legged kittiwakes*, Rissa tridactyla.* Presentation to Scottish Power Renewables Conference on Offshore Wind and Ornithology

[9] Cleasby, I. R., Owen, E., Wilson, L., Wakefield, E. D., O'Connell, P., & Bolton, M. (2020). Identifying important at-sea areas for seabirds using species distribution models and hotspot mapping. *Biological Conservation*, *241*, 108375.

[10] Woodward, I., Thaxter, C.B., Owen, E. & Cook, A.S.C.P. (2019) Desk-based revision of seabird foraging ranges used for HRA screening. BTO Research Report No. 724.

[11] Searle. K.R., Mobbs, D.C., Butler, A., Furness, R.W., Trinder, M.N. & Daunt, F. (2018) Finding out the fate of displaced birds. Report to Marine Scotland Science

without any attempt to determine the behaviours and conditions at the Application area and therefore consider what speed in this range the birds on the development site will be flying at is grossly over-simplistic and entirely inappropriate.

3.7 A far better approach would be to obtain site-specific data on the speed that kittiwake, via tagging, laser-rangefinder or a radar/camera system as used in ORJIP and also recently at the European Offshore Wind Deployment Centre. In the absence of such data, a precautionary value must be set, and there is no evidence to suggest a change from the value advocated by Natural England. It should be noted that, from the Applicant's own review, the recommended value is lower than some reported in that review, therefore it is wholly incorrect to describe it, as the Applicant repeatedly does, as overly precautionary.

4. Population Viability Analysis

4.1 In Tables 1 and 2 below we present the annual collision mortalities and Counterfactuals of Population Size (CPS) taken from the Applicant's own calculations. We have focused on CPS outputs of Density Independent formulations, and present our rationale for this in sections *a)* and *b)* below.

Table 1. The predicted annual mortalities arising from collision and the CPS for in-combination impacts for gannet and kittiwake after 30 years for various scenarios including or omitting Hornsea Project 3 and Project 4. For gannet the results are presented with both the Applicants and the RSPB preferred position on avoidance rate. The figures are taken from tables A2_1.1 and A2_5.1 in MacArthur Green (2018)[12]. As these figures are reported in those tables in increments of bird mortality, 25 birds for gannet and 50 for kittiwake, these have been rounded to the nearest increment. As Table A2_1.1 only presented gannet annual mortalities up to 500 birds, the CPS for the predicted mortalities of 601 and 552 are shown as *greater than* the value for 500.

		With H3 and H4		No H3		No H4		No H3 or H4	
		Mortality	CPS	Mortality	CPS	Mortality	CPS	Mortality	CPS
Gannet	Applicant	359	37.1	332	34.9	315	34.9	288	32.7
	RSPB	601	> 48.5	552	>48.5	521	48.5	473	46.7
Kittiwake	Applicant	699	20.5	445	13.7	543	16.4	363	10.8

Table 2. The predicted annual mortalities arising from collision and the CPS for in-combination impacts for lesser black-backed gull after 30 years. The CPS value is that presented in table 3.15 of the Applicant's Offshore Ornithology Update (REP2-035), and is for an annual mortality of 35 birds.

	Mortality	CPS
Lesser black-backed gull	54.2	33.1%

a) Counterfactual of Population Size and Growth Rate outputs

4.2 The CPS is the ratio of the expected population size with the wind farm to that without it, as derived from Population Viability Models. To calculate it, a PVA is run predicting the size of the population in question in the absence of a wind farm and this is compared with the size of the population predicted if the additional mortality arising from the wind farm is included. The population sizes are compared after the life of the wind farm, typically 25 or 30 years. As there is additional

[12] MacArthur Green (2018) Appendix 9 to deadline 1 submission, Population Viability Analysis. Hornsea Project Three

mortality included in the model run including the wind farm, there is typically a decrease in the predicted population size compared with the predicted population size in the absence of the wind farm. We set this out in detail in our submission for Issue Specific Hearing 4 (AS-041).

4.3 In order to reach their conclusions, the Applicant sets the Counterfactual of Growth Rate output metric against the recent SPA colony growth rate. This is a misapplication of this metric. A key justification of the use of counterfactual metrics (both population size and growth rate) is that they are not influenced by the uncertainty around future populations (Green et al., 2016[13]). We have no robust predictive method that can account for potential changes in population demographic due to unforeseen or unpredictable events, for example, changes in discard policy or severe weather incidents. As the counterfactual approach is relatively insensitive to the assumptions made about the magnitude, variability and trends of demographic rates in the model from which it is calculated, because the same uncertainties apply to both the impacted and unimpacted scenarios, this is not a problem for the counterfactual approach. However, to compare the predicted change in population growth rate in 30 years' time against the current population growth rate does not account for the high probability that the future population growth rate will likely be considerably different from this and that if it were possible it would be this growth rate that should be compared to the predicted change in population growth rate. As it is impossible to determine what that growth rate will be we do not accept this as an adequate method for reaching conclusions of the significance of an effect.

4.4 The Applicant has argued in (REP5-051) that there is no methodological reason why it is inappropriate to compare a predicted measure of future growth against the most recent trend. However, to do so in order to reach a conclusion of no adverse effect when scientific certainty is required yet the accuracy of that predicted measure of future growth rate is completely unknown is entirely inappropriate.

b) Density dependence

4.5 As detailed in our Written Representations (REP2-096) and comments on the Offshore Ornithology Assessment update (AS-041), the RSPB does not accept the arguments for the use of PVA outputs incorporating compensatory density dependence. The reasons for this are outlined in Green *et al.,* (2016) and the reviews by Cook and Robinson, (2015) and O'Brien *et al*., (2017), and are not that density dependence does not exist, but rather that we do not have the means to accurately quantify the strength and form of it in a biologically meaningful way in order to incorporate it into PVA. While we acknowledge that this phenomenon of density dependence is well established, there remains scant data to underpin the modelling of such processes, notably for seabirds, as this modelling requires detailed knowledge of demographic rates or population growth rate across a wide range of densities under otherwise comparable conditions for the species and population of interest.

4.6 In order to incorporate density dependence into a PVA, a mathematical function is usually added, which links the population size with a demographic rate or rates. Alternatively, density may be assumed to influence population growth rate through an unspecified demographic mechanism. This function will include a number of fixed parameters, which mathematically describe the relationship between population size and demographic rate or population growth rate. These

[13] Green, R. E., Langston, R. H. W., McCluskie, A., Sutherland, R. and Wilson, J. D. (2016), Lack of sound science in assessing wind farm impacts on seabirds. Journal of Applied Ecology. doi:10.1111/1365-2664.1273

parameters would ideally be estimated with high precision from demographic data from the population of interest.

4.7 The PVAs cited by the Applicant have used a Weibull mathematical function to describe the relationship between reproductive rate and population size. This function describes the strength and shape of density dependence acting on the modelled populations. This function has 3 parameters: *α, β,* and *maxF.* It is important to note that **none** of these values are presented with supporting empirical evidence. In support of their use of density dependent models (REP5-051), the Applicant cites their consultants earlier report (SOSS 04, 2012[14]). The RSPB welcomes this citation, noting that it says "*in the absence of compelling support for density dependence, the simpler modelling approach should be favoured*", and are in complete agreement with that approach, since as detailed above, there is no supporting evidence for the parameters used to define the function to describe density dependence for kittiwakes.

4.8 It is important to acknowledge that density dependence is not always compensatory, but can also be depensatory, slowing the rate of population growth at lower population densities. In other words, a population decline arising from an offshore wind farm could have larger consequences on the population than are predicted by the compensatory density dependent or even density independent models. Horswill and Robinson (2015) identified depensation occurring in three gull species (black-legged kittiwake, black-headed gull and herring gull) and it has been argued that depensatory density-dependence may be appropriate to explore in future adaptations of these models, particularly for kittiwake, due to severely reduced population sizes (Miller *et al.*, 2019[15]). As such, it is incorrect to argue that density independent outputs are highly precautionary.

5. The RSPB's comments on the Report on the Implications for European Sites (RIES)

5.1 The RSPB has reviewed the RIES and considers it represents an accurate overview of the offshore ornithology discussions. It helpfully summarises the key points being debated and clearly sets out the areas of agreement and disagreement. There are, however, a few areas that we wish to provide comments on in order to clarify our position or ensure accuracy:

a) Comments on the Applicant's Screening matrices submitted at Deadline 6

5.2 The RSPB notes the comment made by the Applicant with regards the Galloper Offshore Wind Farm impacts on the lesser black-backed gull population of the Alde-Ore Estuary SPA. For clarity, the RSPB was not able to conclude no adverse effect on integrity for that project based on the collision risk modelling that was presented. The reasons for our concerns remain, as the population continues to be unfavourable and ongoing work continues to be required to restore the population in line with the Alde-Ore Estuary SPA conservation objectives.

[14] SOSS-04 Gannet Population Viability Analysis. (2012) Developing guidelines on the use of Population Viability Analysis for investigating bird impacts due to offshore wind farms

[15] Miller, J. A., Furness, R. W., Trinder, M., & Matthiopoulos, J. (2019). The sensitivity of seabird populations to density-dependence, environmental stochasticity and anthropogenic mortality. *Journal of Applied Ecology*, *56*(9), 2118-2130.

b) Offshore features for which there is not agreement that AEoI can be ruled out (p.30).

5.3 The RSPB notes that Natural England have concluded no AEoI (alone or in-combination) for gannet, guillemot, razorbill and the seabird assemblage if Hornsea Three and Four are excluded from the in-combination assessment. The RSPB accepts a reduction in potential impact following the further mitigation measures, but still considers there to be sufficient scale of impact that an in-combination AEoI on gannet and the seabird assemblage cannot be ruled out. We set out our reasons for this in Section 2 above.

c) Headroom (p.34)

5.4 The RSPB notes the Natural England position summarised in paragraphs 4.8.18 and 4.8.19 (p.34), which highlights the continued level of uncertainty inherent within the assessment process. The RSPB supports Natural England's position that until an agreed approach is developed assessments must be based on the consented designs. The Scottish Government agency Marine Scotland Science has recently awarded a tender for the Production of Cumulative Effects Framework for Key Ecological Receptors and it is anticipated that this will help to address the need for an agreed approach to cumulative assessment in terms of consented and as-built designs. Clearly, however, the results of this work will not be available before the end of the Boreas examination.

5.5 The RSPB continues to have concerns about the concept of headroom as we consider it runs counter to the principles of sustainable development. The industry should be aiming to achieve maximum capacity for least environmental effect, not simply looking to fully exploit the perceived available environmental capacity. The report implies that the calculated 'headroom' for each species is simply expendable. As would be expected, we strongly disagree with this proposition, especially when considering protected species. A more appropriate approach would be to simply present the re-established cumulative totals, without referring to any available headroom. It is for the decision-maker to determine whether predicted impacts of any future proposals are acceptable.

5.6 Currently projects are being examined and consented without strategic oversight to determine which projects would be least environmentally damaging and therefore most appropriate to consent. There appears to be a growing need to develop such an approach to ensure offshore wind commitments will be met in the most sustainable way, but regrettably this is not yet in place.

d) Kittiwake flight speeds (pp.35-36)

5.7 The RSPB has provided detailed comments on this in Section 2 above. We support the position set out by Natural England that speeds are variable and the evidence does not support the proposed amendment by the Applicant, as it risks underestimating potential collision impacts.

e) Kittiwake tracking data (paragraph 4.8.33, p.36)

5.8 The RSPB has set out in our response in our comments on the Offshore Ornithology Assessment update (AS-041) why the Applicant's concerns about the tracking data is inaccurate. We do not have anything further to add, but request that our position be noted fully in the RIES.

6. Concluding comments

6.1 The RSPB welcomes the further mitigation measures proposed by the Applicant during the examination process and we have revised our position in light of the updated impact assessments based on the increased turbine draught height. It is with regret, however, that despite the predicted reductions in impacts to the SPA qualifying features, the scale of change predicted as a consequence of the Boreas development, in-combination with other projects, compared to unimpacted populations, remains such that the RSPB finds it impossible to conclude no adverse effect on integrity on the Flamborough and Filey Coast SPA and the Alde-Ore Estuary SPA as a result of collision mortality. We therefore welcome the Applicant's 'In Principle Habitats Regulations Derogation Provision of Evidence', submitted at Deadline 7, which we will provide comments on by Deadline 10.